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PESTICIDES ABSTRACTS (formerly Health Aspects of Pesticides Abstract Bulletin) is a monthly publication of the Technical Services Division of the Office of Pesticide Programs, Environmental Protection Agency.

The purpose of this publication is to foster current awareness of the major worldwide literature pertaining to the effects of pesticides as defined in the Table of Contents. The publication represents a monthly review of more than 2,000 primary and secondary sources. A list of periodicals from which articles have been abstracted appears annually in the January issue. Subjects and authors of abstracted articles are cross-referenced in quarterly and annual indexes. Reprint requests should be directed to the author of the complete article.

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78-0232. Grunertova, H. ; Frajstak, P. (Natl. Inst. Agrochem. Technol., Bratislava, Czechoslovakia) **Nove smery finalnej upravy pesticidov. [New trends in compounding pesticides for use.]** *Agrochemia (Bratislava)* 17(7): 213-215; 1977. (26 references) (Slovak)

Recent literature on the compounding of biologically active substances to finished pesticides and the characteristics of various application forms are reviewed, including water-soluble powders, dusts, emulsifiable concentrates, wettable powders, suspensions, granules (where the active substance such as soil insecticides, and herbicides, soil disinfectants, aerosols, and most recently microcapsules are applied to an inert carrier). Encapsulation involves the coating of the active substance with an organic or inorganic surface film which protects its against decomposition and reduces its toxicity in handling and its volatility. Coating materials include gelatine, ethylcellulose, phthalate, methacrylate etc. Various additives to pesticides (surface-active agents, polyhydroxy compounds, mineral oils, etc.) represent another improvement of the final application form. Application of pesticides in foam form was found to increase considerably the effectiveness of malathion, methomyl, and some rodenticides. Pesticides should, as a matter of principle, be compounded so as to yield maximum biological effect, and be safe environmentally and in handling.

78-0233. Kundiev, Yu. I. ; Nikitin, D. P.; Erman, M. I.; Khokhol'kova, G. A. (Kiev Sci. Res. Inst. Ind. Hyg. Occup Dis., Kiev, USSR) **Novye gigienicheskie problemy, sviazannye s shirokoi khimizatsiei sel'skokhoziaistvennogo proizvodstva. [New sanitary problems connected with the use of chemicals in agriculture.]** *Gig. Sanit.* 10: 6-19; 1975. (17 references) (Russian)

Recent ecological and toxicological problems of agricultural pesticides are reviewed. Recent studies are concerned with the migration, accumulation, concentration, and metabolism of pesticides in the environment, and the factors influencing these processes. Various pesticides are degraded by soil microorganisms; e.g., 2,4-D, 2M-4C, 2-chlorophenoxyacetic acid and 4-phenoxyacetic acid by *Arthrobacter* sp. Wofatox (methyl parathion), diazinon, carbophos (malathion), dichlorvos, rogor (dimethoate) and thiophos (parathion) are metabolized by certain microorganisms. Twenty-five pathogenic and saprophytic bacteria have been found to be able to degrade DDT to DDD (TDE). Acute poisonings were observed among farm workers working on fields treated with polychloropinene (strobane), even though no traces of this substance were detectable in the air at the time of the poisoning. Model experiments revealed the formation and release of phosgene, cyanogen chloride, hydrogen chloride and chlorine in soil treated simultaneously with polychloropinene and ammonium nitrate fertilizer. These gases are considered responsible for the acute poisonings.

78-0234. Anonymous **Information for authors.** *J. Environ. Pathol. Toxicol.* 1(1): ii; 1977.

Instructions for the submission and preparation of manuscripts for the new publication *Journal of Environmental Pathology and Toxicology* are presented. Manuscripts which relate pathology and toxicology are accepted for review provided they have not been previously published and are not under consideration elsewhere. The journal will also accept and publish rapidly brief communications, letters to the editor, book reports, and announcements of interest to pathologists and toxicologists.

78-0235. Anonymous (Council of Measures for Controlling Environmental Pollution, The prime Minister's Office, Tokyo, Japan) **[Annual reports on the state of environmental pollution in fiscal year 1976 (an outline).]** *Kankocho Kogai Senmon Shiryo (Specialized Data on Environmental Pollution Gathered by Official Agencies)* 12(4): 1-15; 1977. (Japanese)

Concerning water quality, it was stated that no organophosphorus pesticide was found in water samples collected in 1975, in contrast to 1974 (sec. 1 of Part 1 of General Description). In the section on environmental pollution by pesticides, it was stated that the establishment of standards for judging persistence and toxicity of candidate pesticides at the time of registration is being continuously promoted, and that the restriction of existing pesticide use is also being promoted.

78-0236. Anonymous (Council of Measures for Controlling Environmental Pollution, Tokyo, Japan) **[Measures for controlling environmental pollution which will be taken in fiscal year 1977.]** *Kankocho Kogai Senmon Shiryo (Specialized Data on Environmental Pollution Gathered by Official Agencies)* 12(4): 16-45; 1977. (Japanese)

Correlation between toxicity due to combined pollution of PCB and pesticides and vismine-nutrition, and the mechanism of detoxication of insecticides will be continuously studied by the Ministry of Health and Welfare. Effects of organophosphorus insecticides on environmental living things will be studied by the Ministry of Agriculture and Forestry. Especially for controlling environmental pollution by pesticides, more strict standards of sustaining registration of pesticides will be established by studying and carrying out toxicological experiments including carcinogenicity and pathological experiments on fishes. Investigation of pesticide residues in soil will be continued, especially for 14 kinds of pesticides to establish the designation of persistent pesticides in crops and in soils, to establish the use standard of such pesticides for establishment of safe use standard of pesticide.

78-0237. Jukes, T. H. (Author address not given) **DDT: bystander or participant?** *Nature* 259(5543): 443; 1976.

Current attacks on the use of DDT are questioned on the basis that cases in which DDT has been cited as harmful have also involved the presence of other substances with proven harmful effects toward wildlife and man. Studies comparing the effects of PCBs, DDT, and methyl mercury on laying hens revealed that hatchability was reduced at 8 weeks, from 92% in controls to 50% with 10 ppm PCBs and to 2.4%

with 20 ppm PCBs. DDT did not affect egg production or hatchability at the highest level fed (100 ppm). Methyl mercury at 10 ppm adversely affected egg production, eggshell strength, fertility, and hatchability, and it increased morbidity and mortality. Adverse effects attributed to DDT, especially on eagles, have been reported in regions contaminated with mercury. Other analyses have reported damage done by DDT, but the analytical methods used were not able to distinguish between DDT and PCBs. DDT has never been recorded as having poisoned humans through the food supply or by industrial exposure.

78-0238. Hay, A. (Author address not given) **Informing on 2,4,5-T.** *Nature* 269: 749-750; 1977.

The safety of 2,4,5-T, a common herbicide, is widely debated. Cattle from areas treated with 2,4,5-T have shown detectable levels of dioxin in their fat. Rats fed a dosage of 0.1 microgram/kg of dioxin have shown the clinical symptoms of dioxin poisoning, including increased mortality. Lower dosages of .01 and .001 micrograms/kg of dioxin daily have shown lower toxicity. The Montagnard people of South Vietnam, exposed to dioxin levels of up to 30 mg/kg, showed such symptoms as diarrhea, vomiting, skin rashes, fever, abdominal pain, and even the death of some children. At Seveso, Italy, people exposed to dioxin have shown neurological disorders and chloracne. Children born after the mother's exposure to dioxin showed malformations, but statistical examination of the number and types of malformations show that dioxin was probably not the cause. The carcinogenicity of dioxin cannot be fully evaluated at this time.

78-0239. Medved, L. I. (All-Union Scientific Research Inst., Hygiene and Toxicol. of Pesticides, Polymers and Plastics, Kiev, USSR) **Circulation of pesticides in the biosphere.** *Pure Appl. Chem.* 42(1-2): 119-128; 1975. (31 references)

Methods used to study the circulation of pesticides in the biosphere are reviewed. Summarizing research results from various stations permits the principal reasons for excessive pesticide pollution of separate environmental units to be established. Such findings also enable a reasonable standard to be set for each pesticide use. Of particular interest is the keeping of time records between the last pesticide application and harvesting of a particular crop. Such records prevent the appearance of intolerable pesticide residues in foods. Sanitary standards for distance between target and populated areas have been established. The main pesticide cumulator is the soil from which chemicals transfer through root systems into plants. Heptachlor is found in carrots at 1 mg/kg at a level of some thousandths of milligrams in the soil. Pesticides migrate from soil to underground water, natural water and the air. Concentration of some pesticides has been noted in zoophytoplankton and in some fish. Pesticides have been found in animals as well. Only a proportion of such pesticides thus remain on target areas. The rest of the aerosol is carried away by the wind over a distance to higher atmospheric layers resulting in precipitations on non-target areas. It is urged that pesticides selected for use be ones which strictly preclude any prolonged persistent and stable preparations.

78-0240. Marquez Mayaudon, E. (Author address not given) **Los plaguicidas agricolas y la contaminacion ambiental [Agricultural pesticides and environmental pollution.]** *Salud. Publ. Mexico* 17(6): 829-834; 1975. (Spanish)

A review is proposed on the production, use, toxicity, and pollution of soil, air, and water by agricultural pesticides. Biological accumulation and toxic action of pesticides are reviewed, and the possibilities of appearance of previously unknown hazards due to these substances are discussed. The importance of enacting standard regulations to control the distribution and use of pesticides in Mexico is stressed.

78-0241. Walsh, J. (Author address not given) **Seveso: the questions persist where dioxin created a wasteland.** *Science* 197(4308): 1064-1067; 1977.

The most formidable practical task remaining after the Seveso accident is dealing with dioxin in the soil of the most heavily contaminated area. Suggestions have included scraping the topsoil in this area and incinerating it and spreading cow manure to assist the process of bacterial degradation. It may also be necessary to raze the houses and their contents in the most heavily contaminated area. Within a few weeks after the accident, a number of cases of chloracne were diagnosed, and a subsequent mass screening of children revealed 134 confirmed cases of chloracne over the ensuing year. This screening turned up new cases of chloracne in children who had not been in the Seveso area during July and August of 1976, indicating that enough dioxin persisted in the environment several months after the accident to cause chloracne. Adverse effects may result from long-term exposure to very small doses of dioxin as well as from a single heavy exposure. The mutagenic and carcinogenic effects of TCDD on humans are not clear. There remains almost universal regret that a greater systematic effort was not made to maximize the scientific knowledge gained in the aftermath of the accident.

78-0242. Ashworth, B. (Technical Liaison Dept., Rentokil Ltd., Felcourt, East Grinstead, Sussex, England) **Rodenticides.** *Vet. Rec.* 97: 20; 1975.

Two changes to be effected in the wall chart, 'Treatment of domestic animals poisoned by rodenticides' issued to veterinarians by the Rentokil Company are presented in a letter to the editor. Mousex, containing 0.2% warfarin, has been withdrawn, and Rentomus D now contains only 0.1% calciferol in place of the combination of 0.025% warfarin and 0.01% calciferol.

78-0243. Anonymous. **Avoiding the damage.** *Agric. Res.* p. 9; 1977.

Studies were performed to determine whether arsenic residues (from the application of monosodium methanearsonate (MSMA) to neighboring cotton fields) that drift over soybean fields can result in residue accumulation in the beans. Soybeans were sprayed with MSMA at four stages of growth, at intervals from the 2nd to the 11th trifoliolate leaves and at midbloom at application rates of 0.11, 0.22, and 0.44 kg/hectare. No MSMA residues were detected in the beans when the pesticide was applied during the early growth stages, although soybean injury and some reductions in crop yield did occur. These results indicate that there is little danger of MSMA drift leading to accumulation of arsenic residues in neighboring soybean crops when the herbicide is applied early in the season.

78-0244. Helmer, R. (WHO CH-1211 Geneva 27, Switzerland) **Pollutants from land-based sources in the Mediterranean.** *Ambio* 6(6): 312-316; 1977. (2 references)

Steadily growing pollution of the Mediterranean Sea has become more and more apparent during the past decade. The role that land-based pollution sources are playing in the aggravation of present pollution problems is considered in this report, particularly as regards the coastal waters of the Mediterranean. Domestic sewage and industrial wastewaters are well known contributors to such pollution, but the amount carried by rivers or introduced through atmospheric fallout is not known. Thus the assessment of the total pollution input to the Mediterranean Sea from land-based sources became the major objective of a project. One of the areas studied involved agricultural runoff. A pesticide inventory was prepared based on pesticide consumption by agriculture. Information was obtained on the types and quantities of pesticides and their use as insecticide, fungicide, or herbicide. The amount of pesticides used in the respective countries varied rather widely due to the varying types and intensities of

agriculture around the Mediterranean. Only persistent organochlorine compounds were included in this estimate. Breakdown into contributions by specific organochlorine groups shows that about one third stems from DDT compounds, one third from BHC compounds, and one third from other organochlorines. Cyclodienes account for only about 5% of the total.

78-0245. Osterberg, C. ; Keckes, S. (IAEA, Int. Lab. Mar. Radioact., Musee Oceanographique, Monaco) **The state of pollution of the Mediterranean Sea.** *Ambio* 6(6): 321-326; 1977. (26 references)

This paper briefly describes pollutants in the area of the Mediterranean Sea and evaluates the character and importance of the threats they may pose to the marine environment there. Industrial and chemical wastes (plus agricultural runoff) include two pollutants of extreme concern: metals and pesticides. Chlorinated hydrocarbons find their way through various pathways (largely through the atmosphere) to the ocean. Their threat lies in their toxicity and their persistence. The degradation is extremely slow, and some of these substances may even poison the very organisms which are responsible for their degradation in the ocean. The problem of magnification through accumulation in the food chain is discussed briefly.

78-0246. Lopez Gonzalez, J. de D. ; Valenzuela Calahorro, C.; Navarrette Guijosa, A.; Garcia Rodriguez, A. (Departamento de Quimica Inorganica, Facultad de Ciencias, Universidad de Granada, Granada, Spain) **Cinetica de la retencion de DDT por montorillonita sodica. [Kinetics of retention of DDT by sodium montmorillonite.]** *An. Quim.* 73(4): 504-507; 1977. (10 references) (Spanish)

The kinetics of the retention of DDT in cyclohexane solution on sodium montmorillonite was studied at 10, 15, 20 and 25°C. The process was found to be first order. The specific adsorption rate varies from .00164/sec. to .00325/sec. The activation enthalpy is 7.5 kcal/mol, and the activation entropy is -27 cal/ K.mol. The experiments demonstrated that DDT is retained on the surface of sodium montmorillonite in monomeric form, without penetrating into the interlaminar space.

78-0247. Domanski, J. J. ; Nelson, L. A.; Guthrie, F. E.; Mark, R.; Postlethwait, R. W. (Dep. Entomol. Statistics, North Carolina State Univ., Raleigh, NC) **Relation between smoking and levels of DDT and dieldrin in human fat.** *Arch. Environ. Health* 32(5): 196-199; 1977. (25 references)

The adipose tissue of humans with known patterns of cigarette smoking was collected during 1973-74 and analyzed for DDT components and dieldrin. Although smokers are exposed to high levels of insecticides from smoke of cigarettes and some of these compounds can be stored in adipose tissue, it could not be demonstrated that a relationship exists between smoking habit and residual levels of DDT found in fat. Smokers seem able, through induction of enzymes by substances in tobacco smoke, to metabolize these insecticides at a rate approximately equal to the rate of their intake in the smoke. Dieldrin residues in black male subjects were found to be linearly related to the number of cigarettes smoked, but the factors governing this relationships were not obvious. (Author abstract by permission)

78-0248. Hesse, C. ; Hilp, K.; Kating, H.; Schaden, G. (Fachbereich Pharm. Lebensmittelchem., Phillips-Universitaet, Marburg/Lahn, W. Germany) **Inhaltsstoffe aus *Ononis spinosa* L., 2. Mitt. Aromatische Kohlenwasserstoffe aus den aetherischen Oelen der Radix und Herba Ononidis. [Constituents of *Ononis sponosa* L., Part II. Aromatic hydrocarbons from *Ononis spinosa* L. root and leaf essential oils.]** *Arch. Pharm.* 310(10): 792-795; 1975. (8 references) (German)

The gas chromatographic-mass spectrometric analysis of the hydrocarbons of the essential oil of *Ononis spinosa* L. roots revealed the presence of hexachlorocyclohexane (BHC), accounting for ca. 22% of the total essential oil. This high concentration is due to the small amount of essential oils in the root. The presence of hexachlorocyclohexane can be due to spontaneous uptake by the plant or intentional treatment for insect control. The findings indicate that the regular use of the drug prepared from *O. spinosa* in the form of an infusion or decoction may be hazardous.

78-0249. Bartha, R. (Rutgers Univ., New Brunswick, NJ). **Pesticide-humus complexes and their role in crop contamination.** *Acta Microbiol. Acad. Sci. Hung.* 24(1): 58-59; 1977.

Complexes formed between pesticides and humus and their role in crop contamination are considered. The hydrolyzable and non-hydrolyzable binding of 3,4-dichloroaniline (DCA) to whole soil and to isolated soil humic acid was studied. The complex formation is a spontaneous chemical reaction occurring in both natural and sterilized soil. At the 5 ppm level, 80% of the applied DCA became unextractable by solvents within one day. The half-life of the attached DCA in natural soil ranged between 1 and 2 years. About half of the unextractable radioactivity can initially be recovered as unchanged DCA following caustic or acid hydrolysis and steam distillation, but during prolonged incubation an increasing portion of the radiolabel shifts to the non-hydrolyzable form. Therefore, it is not feasible at present to assess the DCA burden of propanil-treated field soils, and an improved analytical technique is needed. It is suggested that the hydrolyzable DCA residues are anils and anilinoquinones. Two possible mechanisms for the reaction are considered. The data suggest that the formation and subsequent biodegradation of pesticide-humus complexes constitutes a heretofore unrecognized mechanism of crop contamination thay may continue to be active long after the originally applied pesticide has become undetectable.

78-0250. Nishimura, H.; Shiota, K.; Tanimura, T.; Mizutani, T.; Matsumoto, M.; Ueda, M. (Detp. Anat. and Legal Med., Fac. Med., Kyoto Univ., Kyoto, Japan). **Levels of polychlorinated biphenyls and organochlorine insecticides in human embryos and fetuses.** *Paediatrician* 6(1): 45-57; 1977. (55 references)

An attempt was made to analyze systematically the storage of PCBs, *p,p'*-dichlorodiphenyl dichloroethylene (*p,p'*-DDE), and β-BHC in intact normal human embryos and in organs

such as the brain, heart, liver, kidney and skin of fetuses and neonates in various developmental stages for the purpose of establishing the normal levels. A similar assay was conducted on these organs in infants and adults who died accidentally; the results were compared with the prenatal data. DDE and BHC levels were constantly demonstrated in the embryos, while PCBs were not detected. All of these compounds were found in all specimens of fetal and neonatal stages, with appreciable individual variability. Their concentrations in fetal and neonatal organs did not exceed the corresponding values in normal adult organs.

78-0251. Anderson, J. P. E. (Inst. Bodenbiol., Forschungsanst. Landwirtsch., Braunschweig, W. Germany). **Einfluss von Temperatur und Feuchte auf Verdampfung, Abbau und Festlegung von Diallat im Boden. [Effect of temperature and humidity on evaporation, degradation and retention of diallate in soil.]** *Z. Pflanzenkrkh. und Pflanzensch., Sonderheft* 7: 141-146; 1975. (8 references) (german)

The degradation, volatilization and binding of ^{14}C-diallate in soil were studied under different conditions in 3-4 week laboratory experiments. Volatilization was negligible in the temperature range of 4-22°C, while the decomposition, increasing with rising temperature, was caused mainly by chemical and enzymatic processes. Volatilization increased in the temperature range of 22-54°C, but the decomposition to $^{14}CO_2$ and non-extractable radioactive metabolites decreased. The formation of water- and benzene-soluble metabolites was practically not influenced by rising temperature in the range of 4-54°C. The principal metabolites were $^{14}CO_2$ and unextractable residues in the soil. Only traces of $^{14}CO_2$ were found, and no significant volatilization of diallate was observed in loosely packed soil (65% pore space) with a water potential of 0.25 bar. The amount of $^{14}CO_2$ and unextractable residue increased with increasing water potential up to 6.5 bar. Traces of water-soluble and benzene-soluble degradation products were detected in all but the driest soil.

78-0252. Rosival, L. ; Szokolay, A. (Natl. Inst. Hyg., Bratislava, Czechoslovakia) **Hygienicke hodnotenie expozicie cloveka DDT a HCH. [Hygienic evaluation of human exposue to DDT and HCH.]** *Cesk. Hyg.* 20(8): 385-394; 1975. (20 references) (Czech)

A study was made of pesticide residues in selected areas of Czechoslovakia. Pesticides in the group of DDT and HCH (BHC) were studied. Lindane (γ-isomer of HCH) and the sum of isomers of HCH did not exceed the values of the acceptable daily dose in the total daily diet. Values of DDT were also lower, but considerably exceeded the acceptable intake at their maxima. Levels in the fat showed the sum of DDT at 11.51 mg/kg in the area of Bratislava. Levels are also given for other areas of Czechoslovakia which were studied. The paper presents other data such as sex of subjects, origin of sample, and constituents of DDT and HCH examined. Levels of residues corresponded to the extent of use of these residues in Slovakia. The compared values from the South-Bohemian region for total DDT equaled the level in the Kossice region, being substantially lower for all values of total HCH than in all other areas of Slovakia. High values of β -HCH in human fat in Czechoslovakia are mainly related to the level of contamination of the food of animal origin, which approaches the level of contamination by DDT.

78-0253. Messori, V. ; Baldi, L.; Bianchetti, G. (Centro Ricerche Rumianca, Borgaro Torinese, Italy.) **Derivati degli 1,2,3 triazoli ad attivita erbicida. [Herbicidal derivatives of 1,2,3-triazoles.]** *Chim. Ind.* 59(6): 438-440; 1977. (Italian)

Studies on the relationships between the structure and herbicidal effects of 1,2,3-triazole derivatives are reviewed. Applied in doses of 1-5 kg/ha, 1-(*m*-trifluoromethyl phenyl)-5-phenyl- 1,2,3-triazole persists in the soil for 2-4 months. Its acute oral toxicity was found to be 1,300-1,400 mg/kg in the rat.

78-0254. Wolfe, N. L. ; Zepp, R. G.; Paris, D. F.; Baughman, G. L.; Hollis, R. C. (Environmental Res. Laboratory, U.S. Environmental Protection Agency, Athens, GA 30601) **Methoxychlor and DDT degradation in water: rates and products** *Environ. Sci. Technol.* 11(12): 1077-1081; 1977. (24 references)

Methoxychlor [2,2-bis(p-methoxyphenyl)- 1,1,1-trichloroethane] and DDT [2,2-bis(*p*-chlorophenyl)- 1,1,1-trichloroethane] undergo different hydrolytic degradation pathways in water at pH's common to the aquatic environment. For methoxychlor at common aquatic pH's, the reaction is pH independent, and at 27 the half-life is about 1 year. On the other hand, for DDT the reaction is pH dependent, and at 27 and pH 7 the half-life is about 8 years. The major products of methoxychlor hydrolysis at pH 7 are anisoin, anisil, and DMDE [2,2-bis(*p*-methoxyphenyl)- 1,1-dichloroethylene]; the major product of DDT is DDE [2,2-bis-(*p*-chlorophenyl)- 1,1-dichloroethylene]. Hydrolytic degradation half-lives of metabolites and reported breakdown products are estimated and compared with the parent compounds. The contribution of hydrolysis is dependent on the amount of methoxychlor and DDT in aqueous solution. Calculations with partition coefficients indicate that even though high concentrations of these two compounds are present in the sediment and biota, a large fraction can be in solution. (Author abstract reprinted by permission of the American Chemical Society)

78-0255. Lind, E. A. (Dep. Zoology, Univ. of Oulu, Oulu, Finland) **A review of pikeperch (*Stizostedion lucioperca*), Eurasian perch (*Perca fluviatilis*), and ruff (*Gymnocephalus cernua*) in Finland.** *J. Fish. Res. Bd. Can.* 34(10): 1684-1695; 1977. (54 references)

A study was made of the percid populations of the waters of Finland which included an investigation of species distribution, relationship of color intensity of water to percentage of predaceous fish inhibitants, and effects of some environmental toxins on percid fish. Cadmium, lead, DDT, and PCB were found only in small concentrations in percids. Mercury was found in highest concentrations in fish from waters near cellulose industries. Due to the reduction in mercury output since 1968, the levels of this metal in percids have also decreased.

78-0256. Hitaka, K. ; Oe, T. (Kyoto Munic. Inst. Publ. Health, Kyoto, Japan) **[Results of a survey on pollution of**

human milk by PCB and organochlorine pesticide residues.] *Kyoto-Shi Eisei Kenkyusho Nenpo (Annu. Rep. Kyoto Munic. Inst. Publ. Health)* 43:70-71; 1977. (Japanese)

A long term study of PCB and organochlorine pesticide residues in human milk was initiated in 1971. In 1976 twenty samples of human milk were collected from lactating women three months after delivery. The samples were analyzed for PCBs, *p,p'*-DDT, *p,p'*-DDE, α-BHC, β-BHC, γ-BHC, and dieldrin. The total DDT (*p,p'*-DDT, + *p,p'*-DDE) was determined as 0.008-0.143 ppm (whole milk) with an average of 0.069 ppm. There has been no further reduction in total DDT since 1974. Dieldrin residues were reduced by one-half during the five year period, with an average of 2.4 ppb in whole milk. There was a noticeable reduction of α-BHC and γ-BHC; however, a reduction in the beta-isomer was not apparent. Total BHC (mostly β-BHC) ranged between 0.032 and 0.271 ppm, with an average of 0.094 ppm in whole milk. The average fat content of the milk samples was 3.4%.

78-0257. Young, D. R. ; McDermott-Ehrlich, D.; Heesen, T. C. (S. California Coastal Water Res. Project, El Segundo, CA 90245) **Sediments as sources of DDT and PCB.** *Mar. Pollut. Bull.* 8(11): 254-257; 1977. (7 references)

Surveys of the chlorinated hydrocarbon concentrations of bottom sediments on the Palos Verdes shelf were conducted during the summers of 1972 and 1975. In addition, DDT and PCB analyses were made on muscle tissues of Dover sole (*Microstomus pacificus*) during this period. The 1972 to 1975 ratios of DDT were 5.5 in wastewater ($p < 0.01$), 1.6 in sediments ($p < 0.05$), and 1.5 in fish muscle ($p < 0.02$). Despite major decreases in chlorinated hydrocarbon emissions, little change in contamination of bottom sediment or fish muscle tissue was observed. These results illustrate the persistence of chlorinated hydrocarbons once bottom sediments have been contaminated.

78-0258. Gaeb, S. ; Schmitzer, J.; Thamm, H. W.; Parlar, H.; Korte, F. (Inst. Oekol. Chem. Gesellsch. Strahlen- Umweltforsch. mbH Munchen, Attaching, Germany) **Photomineralisation rate of organic compounds adsorbed on particulate matter.** *Nature* 270(5635):331-333; 1977. (4 references)

Photomineralization has been shown to be a simple test for evaluating the behavior of chemicals in atmospheric conditions. Insecticides such as aldrin, dieldrin, DDT, DDE, and pentachlorophenol mineralize during irradiation with Pyrex-filtered ultraviolet light; the amount of mineralization increases with the use of short-wave ultraviolet light. Pentachlorobenzene, hexachlorobenzene, and certain PCBs only mineralized when exposed to the short-wave ultraviolet light. Photomineralization experiments were carried out using various chlorinated alkenes, freons, and aromatic hydrocarbons adsorbed on silica gel and aluminum oxide particles. Quantitative determinations of CO_2 evolution and of the mineralized products were performed. CO_2 was found in all cases, and HCl and/or Cl_2 were also found in the case of the chlorinated compounds. The chlorinated alkenes were the most effectively mineralized, the quantity of the formed mineralization products not being noticeably influenced by using quartz- or Pyrex-filtered ultraviolet light. The freons were also degraded using Pyrex-filtered light, but degradation with short-wave ultraviolet light was slightly favored. The aromatic compounds showed a higher persistence with respect to photomineralization. The mineralization rates for these compounds were significantly higher using quartz-filtered light than following irradiation through Pyrex glass. Even comparing benzene with toluene and the xylenes, a tendency to higher CO_2-formation was found.

78-0259. Kohno, M. ; Matsuo, T.; Yamaguchi, Y.; Saito, R.; Sato, K.; Tomaru, K. (Cent. Res. Inst., Jpn. Tob. Salt Public Corp. Tokyo, Japan) **[Studies on aluminum phosphide against stored-tobacco insects. III. An application test of new type aluminum phosphide.]** *Nippon Sembai Kosha Chuo Kenkyusho Kenkyu Hokoku* 116: 35-42; 1974. (10 references) (Japanese)

Fumigation of tobacco leaves in a warehouse was carried out under both cool-dry and warm-humid conditions to determine the decomposition rate, pattern of gaseous spreading, and bioaccumulation in the tobacco leaves of a new type aluminum phosphide fumigant. The new powder-bag type fumigant decomposed somewhat faster than the old tablet type under the cool-dry condition. No differences were observed in residues values between types of chemical, varieties of tobacco, parts in hogshead, and times of fumigation.

78-0260. Addison, F. F. ; Smith, T. G. (Bedford Inst. Oceanogr., Canada) **Organochlorine residue levels in Arctic ringed seals: variation with age and sex.** *Oikos* 25(3): 335-337; 1974. (8 references)

A study of the correlations of blubber pesticide concentrations in the ringed seal *Pusa hispida* with age and sex is presented. Blubber samples were taken from 13 female seals aged 0-27 yr and 15 males aged 1-27 yr and analyzed for organochlorine residues using a GLC method. In male, residue concentrations of DDT ($p < 0.01$), DDE ($p < 0.01$), and PCB ($p < 0.05$) varied significantly with age; however, these relationships were not apparent in females. A nonspecific mobilization of blubber fat during parturition and/or lactation could account for the observed sex differences in the bioaccumulation of organochlorine residues in seal blubber.

78-0261. Yakushiji, T. ; Tanaka, R.; Kunita, N. (Osaka Pref. Inst. Pub. Health, Osaka, Japan) **PCB and organochlorine pesticides in mother's milk, blood and foods.** *Paediatrician* 6(1): 28-33; 1977. (5 references)

Studies were made of the PCB content in mother's milk, blood, and food from August 1972 to February 1973. About 400 samples of milk and 200 samples of blood along with 20 samples of food of Osaka area residents were surveyed with a new modified method using gas chromatography. Residues of PCB, β-BHC, and DDT compounds in the

milk and blood were equivalent to those in the whole of Japan. They were not related to the environmental conditions of the mother, and there was no correlation between PCB concentrations in the food and those in the mother's milk or blood. However, statistical treatment of the data showed that there is a relation between fat percent and PCB concentration in mother's milk. A gradual decrease in the contents of organochlorine pesticides was noted. However, the rates of this decrease are very slow, showing continuation of the contamination for some years to come.

78-0262. Valange, B. ; Marcoen, J. M.; Closset, J. L. (Cent. Etude Pestic. Agric., Gembloux, Belgium) **Degradation du malathion formule sur allapulgite et kaolin: 2. Consequences d'un traitement thermique des matieres de charge. [Degradation of malathion formulated on attaclay or kaolin: 2. Consequences of heat treatment of the carrier.]** *Parasitica* 31(4): 134-153; 1975. (25 references) (French)

The degradation of malathion formulated on attaclay or kaolin is considered with emphasis on the consequences of heat treatment of the carrier. In the course of a study on the storage stability of malathion formulated as indicated, the influence of humidity and of hydroxyl groups on malathion degradation is studied. Each carrier has been characterized by the following properties: differential thermal analysis, x-rays, IR spectroscopy, pH, pKa and surface area. The principal factors inducing degradation of malathion formulated with attaclay or kaolin are the free water content and the structural properties of the clays.

78-0263. Kutz, F. W. ; Yobs, A. R.; Strassman, S. C.; Viar, J. F., Jr. (Ecol. Monit. Branch, Tech. Serv. Div. (WH-569), U.S. Environ. Prot. Agency, Washington, DC 20460) **Effects of reducing DDT usage on total DDT storage in humans.** *Pestic. Monit. J.* 11(2): 61-63; 1977. (6 references)

Agricultural uses of the insecticide DDT were cancelled by the U.S. Environmental Protection Agency December 31, 1972. However, the domestic use of DDT had begun to decline before this action. Beginning July 1969, residues of DDT and its metabolites were measured in human adipose tissue collected through an annual national survey. Levels of total DDT equivalent residues in human adipose have decreased slightly, but the frequencies of finding DDT or its metabolites have remained high. The most marked decline in residue concentration has been found in the youngest age group (0-14 years). Approximately 80 percent of the total DDT equivalent found in this survey was DDE. These data show that the reduction of the agricultural uses of DDT has decreased human exposure to and storage of this chemical. (Author abstract by permission)

78-0264. Kendall, R. J. ; Noblet, R.; Hair, J. D.; Jackson, H. B. (Dep. Entomol. Econ. Zool., Clemson, SC 29631) **Mirex residues in bobwhite quail after aerial application of bait for fire ant control, South Carolina--1975-76.** *Pestic. Monit. J.* 11(2): 64-68; 1977. (15 references)

Mirex, the organochlorine compound used for control of the imported fire ant (*Solenopsis invicta* Buren), was applied aerially under supervision of the South Carolina Plant Pest Regulatory Service in October 1975 to a game management area in Hampton County, S.C. Influenced by recent reports indicating that low levels of mirex were toxic to certain nontarget organisms in laboratory studies, authors initiated a program for monitoring mirex residues in bobwhite quail (*Colinus viginianus*). Pretreatment residues were recorded on a dry-weight basis in bobwhite quail breast and adipose tissue: conversion factors for determining wet-weight concentrations are approximately as follows: fat, 0.77; and breast, 0.29. Residues ranged from 0.000-0.178 ppm and 0.247-2.763 ppm, respectively. Mirex residues in quail adipose tissue showed up to five-fold increase within the first month after treatment and declined thereafter. A residue peak was noticed the spring following mirex treatment, corresponding with insect emergence. Mirex residues in quail collected in summer 1976 following a fall bait application showed slightly higher residue levels than had birds taken in summer 1975; however, little, if any, human food chain contamination would result from the consumption of birds with residue levels in this study. (Author abstract by permission)

78-0265. Suzuki, M. ; Yamato, Y.; Watanabe, T. (Pestic. Res. Lab., Kitakyushu Munic. Inst. Environ. Health Sci., Tobata-ku, Kitakyushu, Japan 804) **Organochlorine insecticide residues in field soils of the Kiyakyushu district-Japan 1970-74.** *Pestic. Monit. J.* 11(2): 88-93; 1977. (23 references)

Residues of organochlorine insecticides were monitored field soils of the Kitakyushu District, Japan, from 1970 to 1974, before and after the insecticides were banned from agricultural fields. The arithmetic mean (AM) and geometric mean (GM) of BHC reached maximum levels in 1970 and 1971, then decreased rapidly during 1972 and 1974. Among BHC isomers, β-BHC had highest mean levels and was therefore thought to be the most persistent of the isomers in field soils. Residues of aldrin, dieldrin, and endrin peaked in 1970 and/or 1971, and then decreased yearly. The percentage of sites which had aldrin contamination have decreased: those with dieldrin contamination have increased. Mean values of *p,p'*-DDE, *p,p'*-DDT, and DDT declined more slowly than did BHC and cyclodienes. Values of DDT and its related compounds were higher than were those of BHC, aldrin, dieldrin, and endrin. The residues of *p,p'*-DDE were most frequently detected of the DDT compounds. (Author abstract by permission)

78-0266. Moore, S., III ; Petty, H. B.; Bruce, W. N.; Randell, R.; Kuhlman, D. E. (Ill. Coop. Ext. Serv., Urbana, IL 61801) **Dieldrin residues in soybeans in Illinois, 1965, 1966, 1967, 1971, and 1974.** *Pestic. Monit. J.* 11(2): 94-98; 1977. (13 references)

The Illinois soybean crop was monitored in 1965, 1966, 1967, 1971, and 1974 for dieldrin residues resulting from aldrin applied to corn in the years before soybean cultivation. Residue levels of dieldrin in soybeans increased be-

tween 1965 and 1974. The percent of fields which had soybeans with a dieldrin level above 0.03 ppm increased between 1965 and 1974. Dieldrin residue levels in soybeans grown in Illinois are expected to decline now that the use of aldrin has diminished and will soon cease. No significant correlation was evident between the dieldrin levels in soybean and the area of the State where they had grown, the date of planting, or the variety. (Author abstract by permission)

78-0267. Reeves, R. G. ; Woodham, D. W.; Ganyard, M. C.; Bond, C. A. (Anim. Plant Health Inspect. Serv., Otis AFB, MA 02542) **Preliminary monitoring of agricultural pesticides in a cooperative tobacco pest management project in North Carolina, 1971--first year study.** *Pestic. Monit. J.* 11(2): 99-106; 1977. (8 references)

A preliminary tobacco pest management pesticide monitoring project was initiated in two countries of North Carolina in 1971 to develop an ecologically, economically, and socially acceptable system for protecting tobacco from damaging insect and disease pests. Results from the first year's study including sampling procedures, samples preparation, and analysis and residue data are presented in this paper. (Author abstract by permission)

78-0268. Baldwin, M. K. ; Bennett, D.; Beynon, K. I. (Shell Toxicol. Lab. (Tunstall), Sittingbourne Res. Cent., Shell Res. Ltd., Sittingbourne, Kent, England, ME9 8AG) **The concentrations of aldrin and dieldrin and their photoisomers in the atmosphere.** *Pestic. Sci.* 8(5): 441-445; 1977. (19 references)

Air samples taken in 1973 at a point remote from areas of organochlorine pesticide usage, Bantry Bay in S.W. Ireland, were analysed for aldrin, and dieldrin in the vapour state and in association with particulate matter. In addition, some of the samples were analysed for the photoisomers of aldrin and dieldrin, and for *p,p'*-DDT, 1,1-dichloro- 2,2-di-(4-chlorophenyl) ethylene (*p,p'*-DDE) and *p,p'*-TDE. Detection and quantitation of all compounds were by gas-liquid chromatography with electron capture detection (g.l.c./e.c.). Confirmatory evidence for the presence of dieldrrin and *p,p'*-DDE was obtained with some samples using gas-liquid chromatography with mass fragmentographic detection (g.l.c./m.f.). Dieldrin was detected in all seventeen samples of air taken, but the mean concentration was 0.36 ng/kg and the range of concentrations was 0.06-1.60 ng/kg. Aldrin was not detected in the samples examined, neither were the two photoisomers. Only *p,p'*-DDE of the *p,p'*-DDT group of compounds was detected in the nine samples examined, and the apparent mean concentration was 0.14 ng/kg. None of the compounds was detected in particulate matter. (Author abstract by permission)

78-0269. Smith, A. E. ; Walker, A. (Agric. Can. Res. Stn. Regina, Saskatchewan S4P 3A2, Canada) **A quantitative study of asulam persistence in soil.** *Pestic. Sci.* 8(5): 449-456; 1977. (15 references)

The persistence of the herbicide asulam was studied at different controlled temperature and moisture levels in Regina heavy clay. Degradation was rapid, approximating to first-order kinetics with a half-life of about 7 days, at temperatures in the range 20-35 C and at moistures of above 50% of field capacity. At lower soil temperature and/or moisture regimes, breakdown was slow. The laboratory data were used in conjunction with the appropriate meteorological records in a computer program to simulate the degradation pattern for asulam in six separate microplot field studies carried out during May to November 1976. In three of the six experiments there was close correspondence between observed and predicted residue levels, but in the other three experiments, the model underestimated rates of loss. (Author abstract by permission)

78-0270. Ripley, B. D. ; Simpson, C. M. (Prov. Pestic. Res. Testing Lab., Ontario Minist. Agric. Food, c/o Univ. Guelph, Guelph, Ontario NIG 2WI, Canada) **Residues of zineb and ethylene thiourea in orchard treated pears and commercial pear products.** *Pestic. Sci.* 8(5): 487-491; 1977. (15 references)

Zineb and ethylene thiourea (ETU) residues were monitored in Bartlett pears after spraying with zineb (5.04 kg a.i./ha). Zineb dissipated seven times faster in the first 10 days after application than in the subsequent days of the study; ETU residues ranged from 0.02 to 0.01 mg/kg over the 21 day trial. A 3-6% conversion of ethylenebisdithiocarbamate to ETU was found boiling treated pears. Analysis of randomly selected commercially canned pears and baby food pear puree showed no zineb residues but < 0.05 mg ETU/kg was pesent in four of the six samples of baby food. (Author abstract by permission)

78-0271. Kaaijk, J. ; Frijlink, C. (Chem. Lab., TNO, PO Box 45, Rijswijk, The Netherlands) **Degradation of *S*-2-di-isopropylaminoethyl *O*-ethyl methylphosphonothioate in soil. Sulphur-containing products.** *Pestic. Sci.* 8(5): 510-514; 1977. (3 references)

The degradation of [^{35}S]-labelled and [^{32}P]-labelled *S*-2-di-isopropylaminoethyl *O*-ethyl methylphosphonothioate has been studied in humic sand, humic loam and clayey peat under laboratory conditions. Radioactivity, which proved to be tightly bound to the soil, was extracted by alkaline methanol. *N,N*-Dithiodiethylenebis (di-isopropylamine) was identified as the only sulfur-containing product in the extract. (Author abstract by permission)

78-0272. Bush, P. B. ; Shutze, J. V.; Charles, O. W.; Casey, J. M. (Univ. Georgia, Extension Poultry Sci. Dep., Athens, GA 30602) **Georgia extension pesticide residue analysis project.** *Poultry Sci.* 54(5): 1740; 1975.

To assist the Georgia poultry industry in its quality control surveillance of feed ingredients, a laboratory has been established to routinely monitor feed ingredients. The majority of the samples (1800 analyzed in 1974) were below action

levels. However, chlordane, BHC, lindane, methoxychlor and toxaphene were found to approach or exceed acceptable limits in about 3% of the samples. Toxaphene in peanut hulls and methoxychlor in rice mill feed were most consistently found. Toxaphene was found in 95% of the peanut hull samples tested, levels ranging from non-detectable to 14.9 ppm in a 109 sample survey. The highest level of methoxychlor, 2.8 ppm, approached the 3.0 ppm action level in the rice mill feed. Most fat and fish meal samples contained low levels of DDT as well as its metabolites and dieldrin. One lot of fish meal contained 2.0 ppm of chlordane. (Author abstract by permission, abridged)

78-0273. Miki, T. (Japan Sugar Refiners Association, Tokyo, Japan) **PCB and organochlorine pesticides residue in sugars.** *Seito Gijutsu Kenkyukaishi (Proc. Res. Soc. Japan Sugar Refineries Tech.* 25: 32-38; 1975. (Japanese)

Results of a gas chromatographic analysis carried out for polychlorinated biphenyl residues in refined sugars, liquid sugars, refinery molasses, and raw sugars are presented. Analysis was also made of residual organochlorine pesticides including α-, β-, γ- and δ-BHC, *p,p'*-DDE, and dieldrin in raw sugars. PCB was not detected in the refined products, including 35 samples of refined sugars and 6 samples of liquid sugars. PCB was detected in 3 of 20 samples of raw sugars and in 3 of 5 samples of molasses. However, the levels of PCBs found were very low, less than 0.03 ppm. In analyses for organochlorine pesticide residues in 18 raw sugar samples, 2 showed a relatively higher peak height of gamma-BHC on the chromatograms, but the content was less than 0.0063 ppm total BHC. In a few samples trace amounts of DDT and DDE were found.

78-0274. Aitsam, A. M. (Baltic Sea Dept., Inst. Thermophysics and Electrophys., Acad. Sci., Estonian SSR, Tallinn, USSR) **Transport mechanisms of water.** *Pure Appl. Chem.* 42(1-2): 105-111; 1975. (20 references)

A study was made of the transport mechanisms of substances in natural water bodies. Substances which are dissolved can be regarded as passive in that they do not affect the velocity field of the water bodies. The actual particles of the dissolved substances are regarded as either active or passive. Convection and/or molecular and turbulent diffusion are the causes of substance transport. Bouyancy forces have, therefore, some influence on the vertical transport of substances. In general the vertical transport of substances is several orders of magnitude less than the horizontal. Molecular diffusion can usually be neglected. Convection transports the substances as a solid body. The substance spreads over the whole water body by diffusion. The plume edges are relatively sharp. Diffusion horizontally is dependent on the scale of the various processes, and vertical diffusion is much reduced and sometimes becomes of the same order as molecular diffusion. In rivers and in the upper and bottom Ekman layers of oceans, seas and lakes, the horizontal and vertical diffusions are of great importance. For vertical tubrulent transport, the thermocline and halocline are practically impenetrable. Vertical flows through them appear to result from doubled-diffusivity convection due to the overturning of internal waves and due to upwelling water in the coastal areas.

78-0275. Lichtenstein, E. P. (Dept. Entomol., Russell Labs., Univ. Wisconsin, Madison, WI 53706) **Transport mechanism in soil. Metabolism and movement of insecticides from soils into water and crop plants.** *Pure and Applied Chem.* 42(1-2): 113-118; 1975. (8 references)

Various environmental conditions affect the persistence, movement, and metabolism of insecticides in soils. In this report field data are presented which demonstrate that phorate, after granular band application, moves in both the horizontal and vertical directions. The major metabolite recovered was phorate sulfone. The mode of application affected the metabolism and persistence of this insecticide. The percolation of water through this system did not affect the movement of carbon-14 labeled phorate through loam soils but did so with soils of lesser or no sorptive capacity. These studies were made using a soil-plant-water ecosystem. Phorate metabolites were found in water percolated through agricultural soils. These metabolites were phorate sulfoxide and phorate sulfone. Corn greens grown in this system contained phoratoxon sulfoxide and phoratoxon sulfone in addition to the aforementioned metabolites. Using carbon-14 labeled dyfonate it was shown that the insecticide did not move to any great extent through an agricultural loam soil and its transport with water through soils was largely a function of soil type. Detergents indirectly increased the amount of parathion within the percolated water. The presence of salts prevented the appearance of aldrin residues in percolated water and reduced parathion residues. Movement of insecticides from soils into plants was dependent on energy supply systems of root cells, soil nutrients and soil insecticide concentrations.

78-0276. Bagge, P. (Dep. Hydrobiol., Univ. Jyvaskyla, SF-40450, Jyvaskyla, Finland) **Pesticide residues in some Baltic animals - a review of selected literature.** *Pure Appl. Chem.* 42(1-2): 129-137; 1975. (25 references)

Generalizations resulting from studies tracing the disposition of halogenated hydrocarbons (in particular DDT and PCBs) and of mercury in Baltic animals are presented. The concentrations of the compounds in the tissues of Baltic animals are in general higher than those found in the corresponding species on the west coast of Sweden and in the Norwegian waters. Highest levels of DDT compounds occur in animals of the southern Baltic and the Sound. Highest contents of methylmercury occurred in certain coastal areas, usually areas polluted by pulp mill wastes, while the fish caught in the open sea were less contaminated. Especially high concentrations of pesticide residues were noted in fish-eating birds and mammals, i.e., animals representing the top levels of the food chains. In the Baltic areas no fatal poisoning of fish and waterfowl due to pesticide concentrations has as yet been found. The situation, however, is worse with white-tailed eagles and some other raptorial birds whose popula-

tions have been almost totally wiped out in many coastal regions.

78-0277. Robinson, J. (Tunstall Lab., Shell Res. Ltd., Sittingbourne, Kent, England) **Mathematical models in ecochemistry.** *Pure Appl. Chem.* 42(1-2): 139-153; 1975. (26 references)

A brief outline is given of the general concepts concerning models, their logical and analogical status, as useful in ecochemistry. A discussion of carbon dioxide in the atmosphere and oceans and its uptake by plants is used to illustrate the use of compartmental models to simulate the kinetics of compounds in the environment. A review is made of the application of compartmental models to the kinetics of organochlorine compounds in vertebrates and in the ecosystems. Assumptions used to simplify such models are explained. It appears from the evidence available, and assuming the compartmental models are valid simulations of ecosystems, that there may be significant mechanisms of removal of organochlorine insecticides from the biosphere, possibly by chemical degradation in the troposphere or stratosphere. These mechanisms require detailed investigation in order to assess their relative importance.

78-0278. Goto, M. (Dep. Chem., Gakushuin Univ., Toshima-ku, Tokyo, 171 Japan) **Pollution problems of the Seto Inland Sea** *Pure Appl. Chem.* 42(1-2): 155-166; 1975. (6 references)

Pollution problems of the Seto Inland Sea are discussed. The Sea is surrounded by the most important industrial districts of Japan, and is heavily fished. The pollution in this Sea offers an example of a confined aquatic environment. A more detailed water quality survey on each organic pollutant should be conducted regularly to clarify the dispersion pattern. This report includes a discussion of the general features of the Seto Inland Sea, consideration of the red tide, information on heavy metals in the sea deposits, and specific information on specific pollutants. These specific pollutants include PCB contamination and oil pollution.

78-0279. Rosival, L. ; Szokolay, A. (Res. Inst. Hyg, 882 01 Bratislava, Czechoslovakia) **Ecochemistry of BHC in Czechoslovakia** *Pure Appl. Chem.* 42(1-2): 167-176; 1975. (16 references)

This paper reports the results of a study concerning the wide use of BHC in Czechoslovakia. The study involved a complex ecochemical and epidemiological approach to BHC contamination and contamination by BHC isomers in comparison with DDT. All samples were taken from three regions of Slovakia, one of them representing a low land type geographical region, another a mountainous region, and the third one representing a mixed region with lowlands-like agriculture. In all investigated samples α-, β-, and δ-isomers of BHC were found in addition to lindane. Relations between the cumulation of γ- and β-BHC in different media show the effect of retarded accumulation and elimination of β-BHC in animal foodstuffs. This effect was expressed in human materials, where the content of the β-isomer clearly exceeded the content of the gamma-isomer. The results also show a gradual shift from DDT-contamination toward lindane. A survey of the connection between the embryonic exposure and post-mortem levels of pesticides and the degree of the use of pesticides in different regions is presented.

78-0280. Dunn, C. L. (Hercules Inc., Wilmington, DE) **The value of worldwide pesticide residue monitoring systems.** *Pure Appl. Chem.* 42(1-2): 177-188; 1975. (8 references)

The background to present and future pesticide use, some principles of monitoring, some specific examples of monitoring programs, and some evaluations and recommendations concerning them are discussed. The objectives of a pesticide monitoring program are normally related to assuring safety to man and his environment. The assignment of costs in terms of resource allocation are considered and should include an estimate of alternative productivity if the resource were utilized in some other endeavors. The ultimate value of monitoring systems may lie in providing a better foundation on which to base both scientific estimates and political decisions.

78-0281. Wassermann, M. ; Tomatis, L.; Wassermann, D. (Dep. Occupational Health, Hebrew Univ., Hadassah Med. Sch., Jerusalem, Israel) **Organochlorine compounds in the general population of the seventies and some of their biological effects (in man and animals).** *Pure Appl. Chem.* 42(1-2): 189-208; 1975. (169 references)

This paper reports information on the presence of organochlorine compounds in the general population of the seventies and some of the biological effects in both man and animals as a result of these chemicals. The composition of the environment and the biochemical individuality of a given organism and its environment. One of the characteristics of living organisms is to carry foreign compounds which enter them through continuous cycles of activity similar to their own constituents. Various chemicals present in our environment enter the organisms and accumulate therein to various degrees. This accumulation and storage constitute a dynamic process. When certain storage levels are reached, effects on the metabolism of normal constituents of the animal body become apparent. There are also effects on the genetic makeup and on the defense mechanisms of the organisms, including detoxication processes, neuroendocrine, and immunologic processes.

78-0282. Clausen, J. ; Berg, O. (Inst. Hyg., Social Preventive Med. and Environ. Sci., Odense Univ., Denmark) **The content of polychlorinated hydrocarbons in arctic ecosystems.** *Pure Appl. Chem.* 42(1-2): 223-232; 1975. (24 references)

The present study was designed to compare the concentration of polychlorinated hydrocarbons (PCHC) in Arctic animals to the content of these components in Greenland-

ers. Greenlanders are mainly hunters and fishermen, which is of interest as food caught locally forms a major part of their diet. Among the birds studied, highest amounts of *p,p'*-DDE and PCB were found in the cormorant and the raven. High amounts of PCB were also found in the Brunnich's Guillemot; *p,p'*-DDT and *p,p'*-DDP were not traced. Among the mammals shot the polar bear contained highest amounts of PCB, but the common porpoise also showed high values. Great individual variations occurred. The mammals all contained relatively low amounts of *p,p'*-DDE when compared to the bird species. Female Eskimoes showed a PCB content of fat tissue equal to that found in the fat tissue of mammals, but lower than the PCB content in the birds.

78-0283. Crosby, D. G. (Dept. Environ. Toxicol., Univ. California, Davis, CA) **The toxicant-wildlife complex.** *Pure Appl. Chem.* 42(1-2): 233-253; 1975. (108 references)

The possibility of unintentional but adverse effects on the world's biota through the dispersion dynamics of pollutants in the environment is reviewed. Familiar vertebrate wildlife comprise less than 5% of the animal kingdom. Of the other thousands of non-insect species, a major proportion are aquatic and will be increasingly exposed to a wide variety of man-made and natural chemicals as time passes. General and simple means for the prediction and estimation of effects and hazards caused by these chemicals are needed for effective management of this toxicant-wildlife complex. A much greater exposure by direct, non-food means had occurred than was expected and the bioconcentration of persistent compounds may be approximated by their lipid-water partition coefficients. By simply measuring the distribution into soil organic matter and biota, environmental degradation, and toxicity, one can obtain an estimate of relative hazard, extended and verified by both direct measurement and comparison of metabolites excreted by aquatic species and by predictive in vitro simulation of primary metabolism. Bioconcentrations of stable substances depends usually on the fat content of individuals and it may not be strongly affected by metabolism. It will not inevitably lead to biomagnification, but it will become increasingly predictive.

78-0284. Patterson, L. K. ; Small, R. D.; Scaiano, J. C. (Radiation Lab. Univ. Notre Dame, Notre Dame, IN 46556) **Reaction of paraquat radical cations with oxygen. A pulse radiolysis and laser photolysis study.** *Rad. Res.* 72(2): 218-225; 1977. (29 references)

The reaction of paraquat radical cations (PQ+) with oxygen has been investigated in methanol-water mixtures and in a number of other alcohols using pulse radiolysis and laser photolysis techniques. Oxidation of PQ+ by O_2 follows clean pseudo-first-order reaction kinetics supporting the hypothesis that the superoxide anion is an important intermediary in the biological behavior of paraquat and related herbicides. Changes in k_1 with variations in the methanol-water solvent mixtures were found to be consistent with behavior predicted by a simple electrostic model relating rate constants of ionization to the solvent dielectric constant. This study opens to question the significance of attempting to extrapolate kinetic information obtained in this type of study to biological systems without first considering what effects the microenvironment solvent system would have on the rate constant.

78-0285. Symons, P. E. K. (Dep. Environ., Fish. Mar. Serv., Biol. Station, St. Andrews, N.B. EOG 2XO, Canada) **Dispersal and toxicology of the insecticide fenitrothion; predicting hazards of forest spraying.** *Residue Rev.* 68: 1-31; 1977. (106 references)

Problems associated with the use of the organophosphate insecticide fenitrothion to control a lepidopterous forest pest, the spruce budworm (*Choristoneura fumiferana*), are considered. Concentrations of fenitrothion in the physical environment, in plants and animals, and the degradation of fenitrothion after spraying are discussed. Laboratory tests demonstrate that fenitrothion is highly toxic to arthropods with median 24-hr LD50 values of 0.187 g/cm^2 and 0.066 ppm for forest insect pests and aquatic insects, respectively. Fish appear to be 100 times less sensitive than the aquatic insects, and insufficient data are available to make generalizations for birds and mammals. More study is needed in regard to the indirect and long term effects of repeated application of fenitrothion in forest spraying. (Author abstract by permission, abridged)

78-0286. Kumpulainen, J. ; Koivistoinen, P. (Dept. Food Chem. and Technol., Univ. Helsinki, SF-00710 Helsinki 71, Finland) **Fluorine in foods.** *Residue Rev.* 68: 37-55; 1977. (56 references)

Studies concerning the presence of fluorine residues in food are reviewed. The effects of fluorine-containing pesticides and fertilizers, industrial fluorine pollution, and water fluoridation on the fluorine load in foods are discussed. The total fluorine load of an individual varies greatly with national, local, and individual food habits. Because of increasing fluorine pollution, it is important to pay attention to the fluorine concentrations of foods, especially in highly industrialized nations where the drinking water is fluoridated.

78-0287. Beane, M. (Chesapeake Bay Cent. Environ. Stud., Smithsonian Inst., Washington, DC) **CBCES tests pollution from Rhode River watershed.** *Smithsonian Res. Rep.* 18: 6-7; 1977.

Pollution was tested from Rhode River watershed. The Rhode River watershed is composed of small basins which drain directly or through creeks into the estuary. The amounts of nutrients coming into and leaving each major land use area in the watershed were determined. In general, the basins having the higher nutrient inputs have the larger nutrient exports in crops, the greater quantities of nutrients leaving in runoff, and the larger net gains of nutrients. Land use appears therefore to be one of the most important variables influencing runoff composition and can be used with rainfall data to roughly predict the magnitude of nutrient discharge from a watershed. Although fecal coliform dis-

charge rates from the Rhode River watershed were low in comparison to those found in runoff from urban areas, the rates were high enough to cause bacteria levels in most of the Rhode River estuary to exceed shellfish harvesting standards in Maryland during parts of the spring and summer of 1974 and 1975. Alachlor and atrazine concentrations were monitored in the soil profile. Alachlor did not persist in the soil. Atrazine was more persistent, remaining in the soil at significant levels four months after application. Herbicide concentrations in the estuary suggest that linuron and atrazine in the Bay are in a range high enough to inhibit the growth of submerged aquatics.

78-0288. Frank, R. ; Holdrinet, M.; Braun, H. E.; Thomas, R. L.; Kemp, A. L. W.; Jaquet, J. M. (Prov. Pestic. Residue Test Lab., Guelph, Ontario, N1G 2W1, Canada) **Organochlorine insecticides and PCBs in sediments of Lake St. Clair (1970 and 1974) and Lake Erie (1971).** *Sci. Total Environ.* 8(3): 205-227; 1977. (24 references)

Sediments were collected from Lake St. Clair in 1970 and 1974 and from Lake Erie in 1971 and analyzed for organochlorine insecticides and PCBs. Suspended solids were taken from the Detroit River in 1974. Residues of DDE, TDE, and DDT were highest in sediment from the Western Basin (70.3 ppb) of Lake Erie and lowest in Lake St. Clair sediment (6.6 ppb and 2.6 ppm in 1970 and 1974, resp.). TDE was the predominant component. While DDT was the lowest component in lake sediments, it was the highest in solids from the Detroit River. PCB residues were about 3 times higher than the total organochlorine insecticide residue, being highest in the Western Basin and lowest in Lake St. Clair. Residues were found to decrease between 1970 and 1974, which coincided with the restrictions placed on the use of these materials. There appears to be a lag period of 2 to 5 years after widespread use occurred and accumulation began in sediments.

78-0289. Hunt, T. W. ; Sheets, T. J.; Collins, W. K. (Pestic. Res. Res. Lab., N.C. State Univ., Raleigh, NC 27607) **MH residues on flue-cured tobacco.** *Tob. Sci.* 179(24): 128-130; 1977. (4 references)

The objective of this study was to determine MH (1,-2-dihydro- 3,6-pyridazinedione) residues on field grown, flue-cured tobacco sprayed with the recommended rate of MH and multiples of that rate with methods and under conditions similar to those used by growers. Average residues over all harvests for a single application of 2.5 kg/ha ranged from 31 to 156 ppm. For two applications of 2.5 kg/ha 6 or 7 days apart of 5.0 kg/ha in a single application, averages over all harvests ranged from 92 to 358 ppm. Tobacco from the lower stalk positions generally contained higher residues than that from the middle and upper stalk positions.

78-0290. Mestres, R. ; Pagnon, M.; Duboul-Razavet, C. (Lab. Chim. Appl. Expert., Fac. Pharm. Montpellier, Montpellier, France) **Etude des residus des pesticides et d'hydrocarbures organochlores dans les sediments du plateau continental Languedocien en Mediterranee. [Pesticide and chlorohydrocarbon residues in the sediment of the Languedoc continental shelf in the Mediterranean.]** *Trav. Soc. Pharm. Montpellier* 35(2): 181-194; 1975. (4 references) (French)

Benthic sediments taken from up to 100 m depth in the Languedoc continental shelf between Sete and Fos-sur-Mer, France, were analyzed for residues of organochlorine pesticides and PCBs using a gas chromatograph with an electron capture detector. All of the results presented are related to moist sediment. The average PCB level was found to be 0.15 mg/kg. The averages found were 0.029 mg/kg for heptachlor and 0.0038 mg/kg for heptachlor epoxide; aldrin was found in 2 samples (0.14 and 0.05 mg/kg, respectively); the same samples also contained dieldrin (0.38 and 0.08 mg/kg). DDD was found in one sample at the 0.1 mg/kg level; *p,p'* -DDE was found in 3 samples in the range of 0.02-0.03 mg/kg. The *o,p'*-DDT plus *p,p'*-DDT level was 0.04-0.15 mg/kg.

78-0291. Mestres, R. ; Tolede, M.; Sabon, F.; Francois, C. (Lab. Chim. Appl. Expert., Fac. Pharm., Montpellier, France) **Etude de l'evolution des residus d'hexachlorobenzene dans les stations d'epuration des eaux usees. [Changes in hexachlorobenzene residues during wastewater treatment.]** *Trav. Soc. Pharm. Montpellier* 37(2): 103-112; 1977. (6 references) (French)

Changes in the concentration of hexachlorobenzene in wastewater being treated in biological wastewater treatment plants and the possibility of the biosynthesis of this substance during wastewater treatment were studied at 5 plants. The hexachlorobenzene concentration was significantly reduced in the wastewater during the biological wastewater treatment process in four out of the five treatment plants. Hexachlorobenzene was removed from the effluent at the rate of 96%. The purification was accompanied by accumulation of this substance in the activated sludge in aeration and decantation tanks, but the aeration tank also had a purification efficiency of 33%, while the drying ditches had a purification efficiency of 62% with respect to the activated sludge. Experiments with wastewater to which L-phenylalanine was added ruled out the possibility of the biosynthesis of hexachlorobenzene during the wastewater treatment process.

78-0292. Moradeshaghi, M. J. ; Weinmann, W. (Faculty of Agriculture, University of Tehran, Karaj, Iran) **Sind Insektizid-Rueckstaende in Sojabohnen gefaehrlich? [Are insecticide residues in soybeans dangerous?]** *Umschau Wiss. Techn.* 77(11): 344-345; 1977. (4 references) (German)

The residue dynamics of diazinon were studied in soil and soybeans under greenhouse conditions following the application of 10% granulated preparation to the soil at the rate commonly used in practice. The residue level dropped to 20% of the original level in the upper 5 cm soil layer, which is partly due to evaporation. However, 10% were still present after 105 days, and residues were still detectable after 150

days (at the time of harvesting). The residue levels were negligible in the deeper soil layers. The residue level was 4-5 mg/kg in the soybeans 45 days after application, and less than 0.02 mg/kg at the time of harvesting. This residue level can be regarded as hygienically irrelevant. Field experiments will be carried out to verify the greenhouse results.

78-0293. Breyl, I. ; Kredl, F. (State Vet. Inst., Jihlava, Czechoslovakia) **Chlorovane pesticidy v potavinach zivocisneho puvodu. [Chlorinated pesticides in foodstuffs of animal origin.]** *Vet. Med. (Prague)* 19(2-3): 121-126; 1974. (5 references) (Czech)

Pesticide contamination of animal derived foodstuffs in Czechoslovakia was assessed. Cheese, ham, pork fat, and dried eggs were tested for residues of DDT, DDE, lindane, and endrin using a gas chromatograph with an electron capture detector. Residues were extracted from samples with acetonitrile and purified on a florisil column. Organochlorine pesticide residues were found in all samples. The highest level of contamination was found in pig fatty tissue, with average concentrations of lindane at 0.109 mg/kg and DDT + DDE at 1.33 mg/kg. In some dried egg samples, levels of DDT + DDE as high 2.5 mg/kg were observed. Endrin was not detected in any of the samples.

78-0294. Sackmauerova, M.; Palusova, O.; Szokolay, A. (Res. Inst. Hygiene, Cs. armady 10, 88201 Bratislava, Czechoslovakia) **Contribution to the study of drinking water, Danube water and biocenose contamination with chlorinated insecticides.** *Water Res.* 11(7): 551-556; 1977. (27 references)

Pesticide contamination of the waters and biota of the Danube from 1971 to 1974 was investigated. Residue levels of DDT, DDE, BHC isomers, and PCB were determined in surface and drinking waters, in herbivorous fish (*Cyprinus carpio* L., *Abramis ballerus* L., *Chondrostoma nasus* L.), in carnivorous fish (*Esox lucious* L., *Lepomis gibbosus* L., *Aspius aspius* L., *Perca fluviatilis* L.), in sediment, and in water plants using GLC and TLC methods. The average pesticide content of Danube drinking water in μg/l for this period was: γ-BHC 0.069, β-BHC 0.023, α- plus δ-BHC plus HCB 0.018, DDE 0.022, and DDT 0.042. The mean levels of these compounds in fish were 1000-10,000 times greater than those found in water.

78-0295. El-Dib, M. A. ; Aly, O. A. (Water Pollution Control, Natl. Res. Cen., Dokki, Cairo, Egypt) **Removal of phenylamide pesticides from drinking waters. I. Effect of chemical coagulation and oxidants.** *Water Res.* 11(8): 611-616; 1977. (15 references)

The efficiencies of chemical coagulation, chlorination, UV-catalyzed chlorination, and oxidation with chlorine dioxide in the removal of phenylamides from municipal water supplies was investigated using colorimetric and TLC methods. Monuron, diuron, linuron, neburon, IPC, CIPC, propanil, dicryl, karsil, and vitavax were the compounds studied. Chemical coagulation proved to be the least effective method of residue removal; maximum level of removal using ferric sulfate was 30%. Effectiveness of the different chlorine methods varied according to the chemical structure of the compounds studied, but oxidation with chlorine dioxide is the method of choice in the removal of phenylamides from drinking water. All of the chlorine methods resulted in the formation of some degradation products which were as undesirable as the parent compound.

78-0296. El-Dib, M. A. ; Aly, O. A. (Water Pollution Control, Natl. Res. Cent, Dokki, Cairo, Egypt) **Removal of phenylamide pesticides from drinking waters. II. Adsorption on powdered carbon.** *Water Res.* 11(8): 617-620; 1977. (14 references)

The adsorption of phenylcarbamates (IPC, CIPC), phenylureas (fenuron, monuron, diuron, linuron, neburon) and anilide pesticides (propanil, karsil, vitavax) on powdered activated carbon using a colorimetric method was investigated. Absorption of these pesticides proceeds in accordance with the Freundlich model in which absorption parameters reflect the effect of chemical structure on the adsorption process and carbon dosages needed for removal of the phenylamides from water. Adsorption of the phenylamides takes place within a few minutes after contact with the carbon. Diuron was most readily absorbed and vitavax was the most difficult, requiring approximately 7x the dosage required for diuron.

78-0297. Schweizer, E. E. (Agric. Res. Serv., Crops Res. Lab., Ft. Collins, CO 80523) **Persistence and movement of** ethofumesate in soil. *Weed Res.* 16(1): 37-42; 1976. (1 reference)

Persistence of ethofumesate [(±)2-ethoxy- 2,3-dihydro-3,3- dimethylbenzofuran-5-yl-methansulphonate] in soil was associated with soil temperature. Ethofumesate applied at 4.5 kg/ha in November persisted about twice as long in soil as that applied the following March. In another field study, 88-91% of the herbicide had dissipated after 24 weeks in sandy loam soil, compared to 72-77% in loam soil when it was applied at rates of 2.2, 3.4, 4.5, and 9.0 kg/ha. The rate of degradation was independent of the initial rate of chemical applied. The time required for 50% of the herbicide to dissipate in sandy loam and loam soils was 7.7 and 12.6 weeks, respectively. The movement of ethofumesate in these two soils over a 24-weeks sampling period was confined mainly to the upper 7.5 cm of the soil profile. (Author abstract by permission)

78-0298. Kennedy, J. M. ; Talbert, R. E. (Dept. Agron., Univ. Arkansas, Fayetteville, AR 72701) **Comparative persistence of dinitroaniline type herbicides on the soil surface.** *Weed Sci.* 25(5): 273-468; 1977. (26 references)

Five field experiments were conducted over 3 yr to compare the effects of delaying soil incorporation of 10 dinitroaniline type herbicides for 0, 1, 3, and 7 days after application. Herbicidal activity was assessed by a sorghum bioassay

and by GLC analysis of soil samples. Oryzalin, nitralin, trifluralin, butralin, fluchloralin, dinitramine, profluralin, benefin, penoxalin, and isopropalin were the herbicides used in the study. Effects of temperature in UV light and dark on loss of dinitroaniline herbicides were demonstrated in the laboratory by applying the herbicides to TLC plates made of soil. Profluralin, benefin, and trifluralin were found to be the most volatile, with losses of 35%, 25%, and 18%, respectively. These studies indicate that application of the intermediate to very volatile dinitroanilines to moist soil surfaces without soil incorporation as soon as possible is not practical unless higher rates of the herbicides are applied.

78-0299. Koch, R. (Bezirkshygiene-Inspektion, Hyg. Inst. Gera, DDR-65 Gera, DDR E. Germany) **Die Bedeutung toxischer Substanzen im Trinkwasser. [The significance of toxic substances in the drinking water.]** *Z. Gesamte Hyg.* 23(2): 96-98; 1977. (German)

General problems of toxic substances in surface water bodies and drinking water are discussed. Water is an ideal vehicle for many environmental chemicals, such as carcinogenic aromatic hydrocarbons, aromatic amines, *N*-nitroso compounds, pesticides, PCBs, halogenated hydrocarbons, mercury compounds, metals, and antibiotics. The health hazards of small concentrations of environmental chemicals in drinking water can be assessed by long-term experiments in animals or perhaps by epidemiological statistical studies. Many pesticides, especially organochlorine compounds, alkylmercury compounds, lead, and cadmium accumulate in vital organs, such as the kidney, liver and brain. The human toxicological problems and hazards of such accumulation are not yet fully understood and ascertained. Many substances that are nontoxic *per se* may metabolize to toxic compounds in the body; this was clearly demonstrated for parathion and malathion, which metabolize to the more toxic compounds paraoxon and malaoxon, respectively. A certain protection from the health hazards of environmental chemicals in drinking-water is possible by the establishment of maximum tolerable concentrations on the basis of toxicological data and the performance of drinking-water preparation and residue analytical techniques.

78-0300. Liotschev, I.; Danon, S.; Tschipilska, L.; Petrov, I. (Inst. Hyg. Ernaehr., Med. Akad., Sofia, Bulgaria) **Normierung von toxischen Stoffen im Boden-eine Untersuchung ueber das Praparat Lasso. [Standardizing toxic substances in the soil. An examination of the herbicide Lasso.]** *Z. Gesamte Hyg.* 23(5): 329-331; 1977. (4 references) (German)

A study was made of the herbicide Lasso (alachlor) in an outdoor model experiment. The persistence of the substance in soil was measured along with its migration properties, its resorption by plants, and its influence on the microflora in the soil. No objections were found from the point of view of soil hygiene. Its persistence is relatively short. It remains in the top 10 cm layer of soil and does not penetrate deeper. It is not accumulated by plants. It does not suppress development of soil microflora. Its bacteriostatic action on certain pathogenic organisms, notably *Bacillus anthracis*, which is noted when applied in large doses, is of interest and merits further observation.

See also **78-0233** **78-0239** **78-0309**

78-0301. Brisou, J. (23, Ave. Claude Farrere, 83100 Toulon, France) **The health situation around the Mediterranean.** *Ambio* 6(6): 342-345; 1977. (18 references)

The morbidity pattern of the Mediterranean shore areas is discussed. Reference is made specially to water-borne diseases, food-borne diseases transmitted by polluted water and by fruit, vegetables, and shellfish consumed raw, and also diseases that are often carried by flies. Pollution from industry, both organic and chemical pollutants, is also considered. More insidious harm is done by chronic, permanent, slow poisoning with substances such as organometallic compounds or pesticides that accumulate in the organism. Accidental poisoning of this particular kind through bathing virtually never occurs. These substances in sea foods pose the problem in an altogether different form and in quite a different pathology.

78-0302. Warriner, R. A., III ; Nies, A. S.; Hayes, W. J. (School of Medicine, Vanderbilt Univ. Nashville, TN) **Severe organophosphate poisoning complicated by alcohol and turpentine ingestion.** *Arch. Environ. Health* 32(5): 203-205; 1977. (10 references)

A 52-year-old comatose white male was admitted to the hospital with what was later learned to be severe poisoning by a turpentine solution of dicrotophos, an organophosphorous insecticide he had ingested while drunk. The patient was treated effectively with atropine and pralidoxime chloride and required the largest doses of both reported to date. The case was complicated by difficulty in evaluating the response to therapy because of the effects of alcohol and turpentine. The patient was discharged from the hospital on the thirty-third day with no apparent sequelae. (Author abstract by permission)

78-0303. Frimat, P. ; Caillard, J. F. (Author address not given) **Les nouveaux tableaux des maladies professionnelles** agricoles. **[The new list of occupational disease among farmers.]** *Arch. Mal. Prof. Med. Trav. Secur. Soc.* 38(3): 394-395; 1977. (French)

A new list of recognized occupational diseases of farm workers was issued in France by Decree No. 75,863 of September 8, 1975. The new list included occupational diseases caused by poisoning with pentachlorophenol, sodium pentachlorophenate, and sodium lauryl pentachlorophenate.

78-0304. Conso, F. ; Neel, P.; Pouzoulet, C.; Efthymiou, M. L.; Gervais, P.; Gaultier, M. (Clin. Toxicol., Hopital Fernand Widal, 75010 Paris, France) **Toxicite aigue chez l'homme des derives halogenes de l'hydroxybenzonitrile (ioxynnil, bromoxynil). [Acute human toxicity of halogenated hydroxybenzonitrile derivatives (ioxynil, bromoxynil).]** *Arch. Mal. Prof.* 38(7/8): 674-677; 1977. (French)

Four workers who had been working for many years in the same shop of a herbicide production plant suddenly developed subacute poisoning within the course of less than 1 year. They were engaged in the production of ioxynil and bromoxynil, and have been exposed to very fine dusts of these herbicides. Weight loss due to excessive perspiration was the first symptom in all cases. Two patients also developed fever, and two complained of emesis. Two patients had myalgia and increased muscular CPK, SGOT, lactate dehydrogenase and aldolase levels. The urinary thiocyanate levels were elevated in three cases (15-40 mg/liter), while no aromatic amines were found. The sudden development of these poisonings was due to the increased production without adequate increase of the ventilation capacity.

78-0305. Grobe, J. W. (Grabenstr. 16, 550 Trier, W. Germany) **Gutachterliche und therapeutische Befunde und Boebachtungen bei Moselwinzern mit Arsenintoxikationsspaetfolgeschaedigung. [Experts' opinion and therapeutic findings in vinedressers with late lesions due to arsenic intoxication.]** *Berufsdermatosen* 25(3): 124-130; 1977. (13 references) (German)

One hundred twenty-two vinedressers presented with late skin damages due to exposure to arsenical pesticides in the Middle Moselle region during 1972-1976. Most of them had been exposed to such arsenical preparations as Silesia Grun and Urania Grun for an average of 20 years during 1920-1942. The average length of the yearly exposure during the spraying was 30 days. The late damages (melanosis, keratosis, and carcinomas) developed after 2-50 or more years (average 26 years). These workers also consumed considerable amounts of poor quality wine less whose arsenic content is 3-30 mg/liter. Transformation of the precancerous lesions into basal-cell carcinoma, squamous-cell carcinoma, and Bowen's disease was observed in many patients. Four patients developed lung carcinoma, 12 bladder carcinoma, and 4 prostate carcinoma, and one had carcinoma of the testes. It was possible to delay or reduce the incidence malignant transformation of precancerous lesions by prophylactic treatment (keratolysis, bathing with neutral soap, cauterization, excision, and X-ray treatment) compared with patients who refused to undergo such treatment.

8-0306. Ahling, B. ; Johansson, L. (Swed. Water Air Pollut. Res. Lab., Stockholm, Sweden) **Combustion experiments using pentachlorophenol on a pilot scale and full-scale.** *Chemosphere* 6(7): 425-436; 1977. (11 references)

Tests have been made on pilot and full-scale operations to investigate the possibility of destroying chlorinated phenol wastes resulting from saw mill treatment of timber. Combustion methods were studied. A transit time of approximately 3 seconds and a combustion temperature of 600 degrees centigrade were used in the pilot scale tests. Under these conditions 70 g of pentachlorophenol showed that the unburned residue was 50 mg/kg fed in pentachlorophenol. At 800 degrees the residue decreased to 15 mg/kg. No octachlorodioxin was found. The full-scale tests with a small amount of pentachlorophenol and a large amount of tetrachlorophenol showed that a 0.9 second transit time and a 620-875 degree temperature gave an unburned residue of 9 mg/kg for tetrachlorophenol and 650 mg/kg for pentachloro-

phenol. Octachlorodioxin was found in the flue gas at one of these tests.

78-0307. Anonymous. **[Presentation of acute toxicity data becomes necessary in applications for registration of combination pesticides.]** *Kongetsu No Noyaku (Pestic. Mon.)* 21(12): 118; 1977. (Japanese)

In Japan, presentation of acute oral and dermal toxicity data on agricultural chemical formulations containing more than 2 active ingredients has come to be obligatory when they are submitted for registration after Nov. 1, 1977, and when submitted for re-registration after Jan. 1, 1978. The test animal for toxicity is the rat. Groups of ten males and ten females are to be used more than one week and after dermal application, 48 hrs. The data should be obtained in more than one qualified test facility in Japan.

78-0308. Knight, H. D. ; Costner, G. C. (Dept. Med., Sch. Vet. Med., Univ. California, Davis, CA 95616) **Bromide intoxication of horses, goats, and cattle** *J. Am. Vet. Med. Assoc.* 171(5): 446-448; 1977. (9 references)

During the summer and fall of 1973, a few horses, goats, and cattle in the Napa Valley of California became intoxicated by bromide via the ingestion of volunteer oat hay that had been cut from a field treated with methyl bromide, a soil fumigant. The bromide content of the hay ranged from 6,800 to 8,400 ppm. Signs of intoxication were lethargy, weakness, and ataxia. Animals experimentally fed the contaminated hay developed signs of intoxication beteen the 7th and 9th days. (Author abstract by permission)

78-0309. Jones, D. M. (Zool. Soc. Lond., Regent's Park, London, NW1 4RY) **The occurrence of dieldrin in sawdust used as a bedding material.** *Lab. Anim.* 11(2): 137; 1977.

Organs from seven owls which died at the London Zoo in April 1976 were analyzed in an effort to determine the cause of death. Several other owls in the collection had died for no apparent reason in the preceding two years. Dieldrin (HEOD) was detected in the owl's livers at 7-30 ppm. Livers of mice from the same colony as those fed to the owls contained dieldrin at 0.5 ppm. An examination of the bedding and foods used for the mice revealed that the sawdust used for bedding contained dieldrin at 100-140 ppm. This sawdust originated from a factory that manufactured wood and door frames, which are treated with dieldrin to control woodworm. It is suggested that animals units using sawdust obtain a guarantee from their supplier that the sawdust is free from known chemical contaminants.

78-0310. Whorton, D. ; Krauss, R. M.; Marshall, S.; Milby, T. H. (Univ. Calif., Berkeley) **Infertility in male pesticide workers.** *Lancet* 2(8051): 1259-1261; 1977. (27 references)

Infertility was noted in a group of men working in a California pesticide factory. Although the study does not prove beyond doubt that the cause in these cases was exposure to the nematocide 1,2-dibromo- 3-chloropropane (DBCP), the evidence linking this chemical with this effect is described. The major effects of the exposure, seen in 14 of 25 non-vasectomized men, were azoospermia or oligospermia and raised serum levels of follicle-stimulating hormone and luteinizing hormone. No other major abormalities were noted, and testosterone levels were normal. Although a quantitative estimation of exposure could not be obtained, the observed effects appeared to be related to the duration of exposure to the chemical.

78-0311. Thomas, P. D. ; Thomas, D.; Yuk-Luen, C.; Clarkson, A. R. (Renal Unit, Royal Adelaide Hosp., Adelaide, Australia) **Paraquat poisoning is not necessarily fatal.** *Med. J. Aust.* 2(17): 564-565; 1977. (6 references)

A case report is offered of deliberate ingestion of Gramoxone (20% w/v of paraquat and 26.2% w/v of paraquat dichloride) by a 20 year old female. The patient was managed with gastric lavage, forced diuresis, hemodialysis, gastrointestinal purgation, and the administration of specific adsorbents. The recovery of this patient is credited to the early institution and rigid enforcement of these measures. The prognosis of paraquat poisoning depends on the amount ingested and on the rapidity of its removal from the gut and the bloodstream. In this particular case the patient had taken about 30 ml.

78-0312. Bartolucci, G. B. ; Mazzotta, M.; Manno, M.; De Rosa, E. (Inst. Med. Lav., Univ. Padova, Padova, Italy) **Esposizione industriale a TOCP ed *n*-esano e comportamento della colinesterase sierica. [Industrial exposure to TOCP and *n*-hexane, and changes in serum cholinesterase.]** *Med. Lav.* 68(3): 222-231; 1977. (16 references) (Italian)

Serum cholinesterase was measured in a group of workers exposed to TOCP and *n*-hexane. Serum levels of this enzyme were significantly lower in the experimental group than in a control group, and this finding was much more apparent among the female workers. The authors suggest that proticopietic damage in the liver is a primary toxic effect of TOCP and *n*-hexane, while alteration of liver and brain cells causes the neurotoxic syndrome.

78-0313. Teare, R. D. (Dep. Forensic Med., St. George's Hosp. Med. Sch., Hyde Park Corner, London, England) **Poisoning by paraquat.** *Med. Sci. Law* 16(1): 9-12; 1976. (9 references)

Paraquat is a valuable herbicide which can be used to avoid soil erosion and render land available for immediate cropping. Although it is peculiarly toxic to man and fatalities have occurred with dosages of as little as 1 ml, there appears

to be relatively little risk of morbidity for the person handling it. In the first 10 years of its use, there were 232 deaths throughout the world. "Stenching" should reduce the number of accidental poisonings but will probably have little effect on the number of suicidal deaths. Five cases of death resulting from the accidental or intentional ingestion of paraquat are described. The symptoms of poisoning included central and epigastric pain, vomiting, sore throat, chest pain, shortness of breath, and dysuria. Death in at least two of the patients was due to cardiac arrest. The autopsies showed jaundice and edema, congestion, and hemorrhage of the lungs. Characteristic microscopic changes in the lung tissue, consisting of fibrosis, hemorrhage, and regeneration, are of great significance.

78-0314. Fungi, L. ; Mora, P.; Cavallaro, S.; Mossetti, G.; Malvestio, G. (Anaesthesia and Resuscitation Service, Regina Margherita Children's Hosp., Turin, Italy) **Un caso di intossicazione mortale da diserbanti. [A fatal case of herbicide poisoning.]** *Minerva Pediatr.* 29(24): 1525-1532; 1977. (30 references) (Italian)

Cases of poisoning by dipirydylium weed killer compounds are becoming more frequent as these substances are increasingly used in agriculture. Some symptoms of intoxication attributed to commercially available weedkillers are described. The clinical course of a case of paraquat poisoning is reviewed, and some therapeutic and prognostic conclusions are presented.

78-0315. Taschenberg, E. F. ; Minnick, D. F.; Bourke, J. B. (Vineyard Lab., New York State Agric. Exper. Statn., Fredonia, NY) **Protecting the tractor operator in the application of pesticidal chemicals.** *N. Y. Fd. Life Sci. Bull.* 54: 1-6; 1975. (7 references)

Absorption through the skin and eyes and inhalation are the two routes by which toxic amounts of pesticides are most likely to gain entrance into the bodies of workers applying insecticides on a commercial scale in the field. Although the use of respirators and protective clothing can provide adequate protection for the handler of highly toxic insecticides, some operators may refuse to use such protection. The introduction and wide use of tractor cabs afforded a new approach to the problem, and an air filter-pressurization unit has been designed and built for mounting on the roof of a tractor cab. The unit consists of a rectangular-shaped metal casing, a series of three filters, and a fan. Testing of this unit was carried out under conditions simulating the cab and filter exposure encountered in normal field operations. Air sampling was done by a liquid absorption or extraction method using acetone as the trapping liquid, and analysis was by flame photometric gas chromatography. For Meta-Systox-R, (oxydemeton methyl) the quantity of insecticide in the filtered air averaged 0.11 μg/l, and all of the toxic insecticides (demeton) Systox and parathion were removed from the air reaching the inside of the cab. According to the data for Meta-Systox-R, an operator inside the cab would inhale about 132 μg of insecticide/hr. This is well below the inhalation LC50 value for rats using the technical formulation. The hazard of dermal contamination is probably reduced to a minimum by the shielding provided by the cab.

78-0316. Hanawa, M. ; Fujisawa, M.; Akimoto, Y.; Oishi, M.; Kobayashi, H.; Osuji, H.; Nishida, S.; Kitahara, K.; Otani, T. (Dep. Internal Med., Seirei Hamamatsu Hospital, Hamamatsu, Shizuoka, Japan) **[An autopsy record of interstitial pneumonia due to acute intoxication by paraquat dichloride.]** *Nippon Naika Gakkai Zasshi (J. Jpn. Soc. Int. Med.)* 66(11): 1597-1598; 1977. (Japanese)

A case involving a 32 year old housewife who swallowed 15 ml of a 24% formulation of paraquat dichloride on June 17, 1976 with suicidal intent was described. Digestive system symptoms such as vomiting appeared just after intake. Steroids and a laxative were given after the cause of poisoning was discovered. Pyrexia, edema, and cyanosis appeared beginning on June 22, with the BUN rising to 100 mg/dl; then the patient was transferred to the authors' hospital. At the time, crepitant rales were heard on the lower left lung. The ERS was 97 mm/h, WBC 11700 (neutrophils, 94%), GOT 47, LDH 535, alkaline phosphatase 41 units, creatinine 7.7 mg/dl and Pa02 and PaC03 23 and 28 mmHg, respectively. Renal disturbance was restored with large amounts of steroids and diuretics. Comfortable sleep became impossible on July 7 due to gasping. The Chest x-ray revealed frosted glass-like and cord-like shadows in both lower lung fields. The patient showed a slight response to 60 mg/d of prednisolone; however, she died suddenly on July 23. Left pneumothorax was revealed after death. At autopsy, thickening of the alveolar septum (slighter proliferation of fibrocytes), degeneration and hemorrhage of kidney tubules, adrenal atrophy, and degeneration of the central vein of the liver were recognized. In Japan, this is the fourth case of interstitial pneumonia due to paraquat dichloride. Foam cells were not observed in this case.

78-0317. Wilmink, G. F. (Min. Agric. Fish., The Netherlands) **Aspects of food inspection and hygiene in the Netherlands.** *R. Soc. Health J.* 97(2): 60-63; 1977.

The Netherlands have created a food control service as a body for the implementation of a Food Law and the various food product regulations. The history and development of the food laws is reviewed, along with current legislation and the implementation of the laws and regulations. Under the Commodity Act, the inspection of foods is carried out by 16 regional Food Inspection Services. The Netherlands was one of the first countries in Europe to promulgate a Pesticides Law, the Pesticides Act of 1962 also being an enabling Act. This regulation declares a food product unfit for human consumption if the residue of the pesticide present in the product is above the established maximum tolerable level. Analyses of more than 24,000 samples of fruits and vegetables in 1973 indicated that the tolerance level was exceeded in only about 2.5%, and no pesticide residues were detectable in about 60%. Most illnesses associated with the ingestion of foods are still caused by microbiological and other biologi-

cal agents and the toxic substances which they produce. Much attention is paid to the occurrence of residues of pesticides in milk and milk products and to the accumulation of substances such as DDT, dieldrin, HCH, heptachlor, and HCB in meat. Continuous monitoring has revealed occasional problems relating to pesticide contamination. Examples of such problems and the steps taken to remedy them are provided.

78-0318. Mosekilde, L. ; Pallisgaard, G. (Dept. Thoracic Med., Odense Hosp., Odense, Denmark) **Alveolitis fibrosa - An occupational disease?** *Scand. J. Resp. Dis.* Supplement 99: 43; 1977.

Eighteen patients with idiopathic alveolitis fibrosa were studied in order to disclose to what extent their pulmonary disease was caused by the inhalation of exogenous agents. The study material comprised 5 women and 13 men, aged 33-75 years. Diagnosis was based on the occurrence of breathlessness, dry rales at both pulmonary bases, bilateral pulmonary fibrosis on chest radiograph, and reduced lung volumes or reduced diffusion capacity. All the patients were disabled. In 12, treatment with prednisolone was initiated with a beneficial effect in 6. The results of this study have shown that even transitory exposure to modern asbestos materials may cause pulmonary fibrosis. Materials such as cadmium, PVC, nylon dust, pesticides, and hair sprays have been claimed to produce similar changes. Careful investigations concerning possible exogenous risk factors should be performed in all cases of alveolitis fibrosa.

78-0319. Kubota, Y. (Dept. Pediatrics, National Narashinao Hospital, Narashino, Chiba, Japan) **[First aid for acute intoxication in children.]** *Shonika Shinryo (Clinical Pediatrics)* 49(11): 1885-1890; 1977. (12 references) (Japanese)

The relationship between the accidential swallowing of insecticides and other chemicals (including cigarettes) and the ages of children was evaluated from the records of the Narashino National Hospital from 1967 to 1976. The total number of cases of infantile acute intoxication was 112, and of these the number of cases due to insecticide ingestion was 25 (8 cases in children younger than one year and 13 cases in between one and two years). Of the chemical intoxications, those caused by organophosphorus pesticides were described in terms of symptoms and first aid. It is recommended that the serum chlolinesterase activity be used to objectively assess the severity of intoxication. For first-aid, stomach lavage, intravenous injections of 20 ml of a 2.5% PAM solution and between 0.5 and more than 5 mg of atropine sulfate, artificial respiration, oxygen respiration, aspiration of tracheal secretions matter, and fluid supplementation were described.

78-0320. Fara, G. M. (Epidemiol. Working Party, Assessorato alla Sanita, Reg. Lombardio, Milan, Italy.) **Seveso: Studies on teratogenic and other chronic effects of chemical pollutants following an accident in a chemical plant.** *Teratology* 16: 365; 1977. (5 references)

The ICMESA accident spread an estimated 800 to 2000 g of TCDD over a densely populated area. Exposure was complete for 15 days, until the accident was clarified and steps taken. Individual levels of exposure were difficult to detect, due to the many variables involved. Much longer exposure is postulated for those who did not follow safety instructions. Acute and mid-term effects such as burns and chloracne took place, and their epidemiology will be described. Expected chronic effects, as shown in previous industrial accidents and in animal experiments, are unspecific, and will be evaluated through an epidemiological survey which includes general and specialized medical examinations, laboratory tests at given intervals. Also the outcome of pregnancies (examination of abortions, stillbirths and infant deaths, follow-up of newborns) will be surveyed for appearance of abnormal rates of C.M. Due attention is given to standardization of collection and recording of pertinent data over an expected period of at least 5 years. Also cancer registry, hospital discharge forms, notification of infectious diseases, birth and death certificates will be used to detect any abnormality of the health of that community. Details of the surveillance plan and its preliminary results will be discussed. (Author abstract by permission)

78-0321. Hayes, W. J., Jr. ; Vaughn, W. K. (Cent. Environ. Toxicol., Vanderbilt Univ. Sch. Med., Nashville TN 37232) **Mortality from pesticides in the United States in 1973 and 1974.** *Toxicol. Appl. Pharmacol.* 42(2): 235-252; 1977. (6 references)

All 1973 and 1974 death certificates in six main categories in which accidental deaths associated with pesticides have been reported were reviewed. For each death in which a pesticide was not definitely excluded by the cause stated on the certificate, a letter was written to the signer of the certificate, to the hospital where the death occurred, or to both. Most accidental deaths from pesticides were classified properly, but some were reported in categories other than the one (E865) specifically established for this class of poisons. A few deaths probably unrelated to poisoning were attributed to pesticides. Some apparent suicides and murders carried out with pesticides were listed as accidents. As in the past, most poisonings in 1973 and 1974 were nonoccupational and involved gross carelessness; a disproportionate number involved males and nonwhites. However, the number of accidental deaths associated with pesticides was greatly reduced. In 1961 and earlier, there were 100 or more such deaths per year in the United States, but the numbers reported in Category E865 were 56 in 1969, 32 in 1973, and 35 in 1974. Counting all categories, the numbers judged to be clear-cut accidents were 97, 62, 45, and 33 in 1961, 1969, 1973, and 1974, respectively. The reduction of deaths from pesticides was accompanied by a reduction in the proportion involving children and an increase in the proportion from very small towns and rural areas. No new example of death caused by an aerosol without wilful misuse was found. (Author abstract by permission)

78-0322. Natl. Inst. Occup. Safety and Health (U.S. Dep Health Education Welfare) **Criteria for a recommended standard...Occupational exposure to parathion.** *Gov. Printing Office, Washington, DC 20460* 80 p.,; 1976.

This criteria document concerns occupational exposures to parathion. Recommendations contained in this report include acceptable concentrations in workplace air, medical surveillance programs, labeling and posting of containers, safe work practices, emergency information, protective clothing, informing the employees of the hazards from parathion, a review of safe work practices, sanitation measures, monitoring, and recordkeeping requirements. The biological effects of exposure are considered. However, in preparation for this report it was noted that there are deficiencies in the available data in the following areas: epidemiologic studies of workers exposed to parathion for extended periods; chronic animal exposure studies at low levels of parathion with emphasis on the central nervous system effects; animal experiments to determine the carcinogenic, mutagenic, and teratogenic potentials of parathion for man; the value of electromyography in assessing the toxic potential of parathion; and improvement of the sampling method for personal monitoring.

78-0323. Dmitriev, P. P. ; Lobachev, V. S. (M. V. Lomonosova, Mosk. Univ., Moscow, USSR) **Podkhody k issledovaniyu problemy "Yadokhimikaty i Fauna" [Approaches in the study of toxic chemicals and the fauna.]** *Usp. Sovrem. Biol.* 83(3): 459-470; 1977. (79 references) (Russian)

Literature dealing with the major approaches in the study of poisonous chemicals and fauna is reviewed. The material is arranged according to the effect toxic chemicals have on various structural levels of a living organism. This effect can be: (1) direct, i.e. toxic, where the toxins damage cell metabolism, hinder the production of enzymes, and act as mutagenic and carcinogenic agents; or (2) indirect, i.e. nontoxic, where there is no specific response from man and the biocenosis to the chemicals. Indirect changes can be caused by factors other than toxic chemicals, such as changes in the landscape, hunting, etc. Further study of ecosystems will aid in discovering more changes caused by toxic chemicals in fauna and understanding the mechanism of self-regulation in humans and the biocenosis.

78-0324. Womeldorf, D. J. ; Atkins, E. L.; Gillies, P. A. (California Dept. of Health, Riverside, CA) **Honey bee hazards associated with some mosquito abatement aerial spray applications.** *Calif. Vector Views* 21(9): 51-55; 1974. (6 references)

A study was made of hazards to honey bees from aerial spray application mosquito abatement chemicals. The toxicants were mostly released in a highly concentrated form as is customary with such programs in California. Insecticides studied included: malathion, parathion, fenthion, methyl parathion, dichlorvos, naled, propoxur, chlorpyrifos, and abate. The results of the studies showed that concentrated applications of fenthion and dichlorvos at mosquito control dosage rates would probably result in appreciable mortality of directly-exposed honey bees. Effects on field colonies would not be expected to be as drastic. In colony bees tested with chlorpyrifos similar acute kills were noted, but the effect was not particularly detrimental, as the total mortality was moderate and the mortality rate declined rapidly. Because dichlorvos and fenthion are no more apt to persist in the environment than is chlorpyrifos and because they have been shown to be less toxic to honey bees than chlorpyrifos, it is not likely that they would result in major colony damage. However, it is viewed as unwise to apply concentrated dichlorvos or fenthion over bees actively foraging in treated fields.

78-0325. Muminov, A. I.; Lutfullaev, U. (Tashkent Med. Inst. Tashkent, USSR) **K voprose o professional'nykh zabolevaniyakh verkhnikh dykhatel'nykh putei u tobakovodov, zanyatykh dofabrichnoi obrabotkoi tabaka. [Concerning occupational diseases of the upper respiratory tract in tobacco-growers engaged in preplant tobacco processing.]** *Vestn. Otorinolaringol.* 4: 59-62; 1977. (4 references) (Russian)

The need to study upper respiratory tract involvement in collective farmers engaged in preplant tobacco processing arose from a literature review which pointed to the high percentage of upper respiratory tract infections among workers in the tobacco industry. Since hygienic conditions differ in different stages of tobacco processing the tobacco growers under study were divided into 4 groups, depending on the combination chemical substances and dust acting on them. The incidence of problems with the upper respiratory tract ranged from 87.5 to 90.5%, with allergic rhinitis diagnosed in 55.5% of all cases. Complex examination of tobacco-growers by a dermatologist, neuropathologist, and hematologist indicated occupational dermatitis in 26.5% of the cases, functional changes of the nervous system in 56.3% of the cases, and the presence of thrombocytopenia and leukopenia. Thus, the clinical characteristics of upper respiratory tract allergens, chiefly due to allergic and neurotropic action, and the existence of a correlation between diseases of the upper respiratory tract, skin, and nervous system, as well as hematological indices confirmed the toxicity of nicotine, and permitted the recognition of occupational exposure as the cause of the disorders.

78-0326. Wheeler, M. (Health Serv. Res., U. S. Publ. Health Serv. Hosp., Box 3145, Seattle, WA 98114) **Gamma benzene hexachloride (KWELL) poisoning in a child.** *West. J. Med.* 127(6): 518-521; 1977. (17 references)

This case report illustrates the course of a nonfatal ingestion of γ-benzene hexachloride, (GBH, lindane), a chlorinated hydrocarbon pesticide commonly used as a 1 percent solution or shampoo for topical treatment of scabies and pediculosis. A baby sitter for a 1 year old boy applied GBH topically as per instructions at 4 PM on the afternoon before admission. When the boy became irritable and hyperactive, she gave him one teaspoon of GBH by mouth at 6 PM by mistake instaed of the diphenhydramine which was to have

been given under these conditions. Within five minutes the boy vomited and continued to do so sporadically throughout the night. He recovered within 6 hr after admission and was sent home with phenobarbital, 5 mg/day. Regardless of how the GBH is absorbed, central nervous system stimulation is the major toxic manifestation of GBH. This particular child had been receiving topical administration of the chemical for 14 days prior to the oral ingestion. Treatment for such cases is s ymptomatic and the prognosis is unknown. Physicians who care for children should be aware of the potential toxicity of γ-benzene hexachloride, as other agents also are available for the treatment of scabies in infants and young children.

78-0327. Harley, J. B. ; Grinspan, S.; Root, R. K. (Yale Univ. Sch. Med., New Haven, CT). **Paraquat suicide in a young woman: Results of therapy directed against the superoxide radical.** *Yale J. Biol. Med.* 50(5): 481-488; 1977. (24 references)

The results of therapy in a case of paraquat poisoning after two suicide attempts are reported. In the first attempt intramuscular and in the second, intravenous injection of the compound was used as the suicide route. The treatment was designed to interfere with the consequence of superoxide production by paraquat. While this treatment did fall, explanations for this failure and current therapeutic alternatives are discussed so that they may be considered when future cases are encountered.

78-0328. Schulz, K. H. (Hamburg, W. Germany) **Dermatologische Aspekte der Intoxikation mit TCDD (Dioxin). [Dermatologic aspects of dioxin intoxication.]** *Z. Hautkr.* 52(6): 198-199; 1977. (German)

Observations on the general toxicological and dermatologic aspects of occupational exposure to dioxin are surveyed. The skin is the first and sometimes the only site of the symptoms of dioxin poisoning. Extended inflammation of the exposed skin area is seen; the inflammation sometimes resembles lupus erythematosis or, erythema elevatum diutinum. This first phase of the poisoning is characterized by more or less pronounced photosensitivity, and is followed by persistent chloracne and sometimes by porphyria cutanea tarda. Other organs and systems may also be involved in the poisoning, especially the liver, hematopoietic system, nervous system, pancreas, and possibly the immune system. Dioxin is teratogenic, and perhaps also mutagenic and carcinogenic.

78-0329. Thiess, A. M. ; Kleinsorge, H. (Aerztl. Abt., BASF Aktiengesellschaft, 6700 Ludwigshafen a. Rh., W. Germany) **Neurotoxisch wirkende Substanzen und Unfallgeschehen in der chemischen Industrie. [Neurotoxic substances and accidents in the chemical industry.]** *Zentralbl. Arbeitsmed. Arbeitsschutz* 27(4): 77-80; 1977. (10 references) (German)

Neurotoxic chemical substances are classified, and acute poisoning accidents observed in the chemical industry are briefly described. Certain pesticides, such as parathion, aldrin, endrin, and organotin compounds have a neurotoxic effect. Aldrin and endrin act upon the brain. Halogenated insecticides and organotin compounds are spasmogenic.

78-0330. Koopman, J. P. ; Henderson, P. T.; Cools, A. R.; Braak, G. J. (Centr. Anim. Lab., Geert Groteplein Noord 29, Nijmegen, The Netherlands) **Possible side effects of the use of diazinon to control insects in a central animal laboratory.** *Z. Versuchstierkde.* 19(5): 253-259; 1977. (8 references)

This report contains information on a possible interference of the insecticide diazinon used in a laboratory to control insects. The insecticide apparently interfered with experiments conducted in the laboratory in which drugs acting on the nervous system were involved. In order to determine whether diazinon had been taken in from the environmental air, serum cholinesterase levels were compared before and after Aquaspray Yellow spraying, both in experimental animals, and in the people working in the animal laboratory. The results of this study showed that following insecticide treatment, diazinon was taken in by both the employees and the experimental animals as evidence from reduced cholinesterase levels. After spraying with this chemical a number of experiments were disturbed. This disturbance may have resulted from the decreased cholinesterase levels. On the basis of this study it is concluded that there is an urgent need to reconsider the adequacy of the Aquaspray-Yellow method of controlling cockroaches in animal laboratories. Perhaps the use of a less volatile insecticide might be considered.

See also **78-0233** **78-0285** **78-0298** **78-0300**

78-0331. Schoental, R. (Dep. Pathol., Royal Vet. Coll., London, England). **Depletion of coenzymes at the site of rapidly growing tissues due to alkylation: the biochemical basis of the tetratogenic effects of alkylating agents, including organophosphorus and certain other compounds.** *Biochem. Soc. Trans.* 5(4): 1016-1016-1017; 1977. (14 references)

It is now suggested that the teratogenic effects of the organophosphorus compounds and their tendency to decrease NAD coenzymes may be related to their alkylating potentialities. The alkylating activity of the various organo phosphorus compounds for the nucleophilic O-, S-, or N-groups correlated with the acidity of the remaining portion of the molecule and decreases in the following order: $(RO)_2P(O)H > (RO)_3P(O) > (RO)_2P(O)R > ROP(O)R_2$. The "dying-back" neuronal degeneration caused by certain organophosphorus compounds appears also to depend on the depletion of coenzymes owing to substitution of their reactive sites by the groups released from the neurotoxic phosphate esters and deficient replacement. Although present evidence points mainly to the depletion of NAD coenzymes, other B vitamins containing coenzymes are also likely to be implicated in fetal abnormalities.

78-0332. Magnusson, J.; Rmael, C.; Eriksson, A. (Environ. Toxicol. Unit. Wallenberg Lab., Lilla Frescati, S-10405 Stockholm 50, Sweden). **Mutagenic effects of chlorinated phenoxyacetic acids on *Drosophila melanogaster*.** *Hereditas* 87(1): 121-123; 1977. (8 references)

The induction of sex linked recessive lethals with 2,4,5-T and 2,4-D herbicides was investigated in *Drosophila melanogaster*. In the test for nondisjunction and chromosome loss both females and males were treated during their whole larval period using substrate containing 250 ppm 2,4,5-T, 100 ppm 2,4-D, 500 ppm MCPA, or 250 ppm MCPA, then mated on ordinary substrate. No effect was observed from these dosages. In the recessive lethal test, adult male Drosophila were treated with 2,4,5-T or 2,4-D in the substrate for two weeks and then mated to untreated females. Recessive lethals were present at a rate of 0.25% of the combined F_1 and F_2 generations from Drosophila treated with 2,4-D, 0.24% of the combined F_1 and F_2 from Drosophila treated with 2,4,5-T, and 0.10% of the combined F_1 and F_2 from the controls. In the F_2 generation alone from Drosophila treated with 2,4-D, recessive lethals accounted for 0.33%, as compared to 0.10% of the control F_2 generation.

78-0333. Kurihara, N. ; Tanaka, K.; Nakajima, M. (Radioisotope Res. Cent., Dep. Agr. Chem., Kyoto Univ., Kyoto, Japan) **Pathways of chlorophenylmercapturic acids formation in biodegradation of lindane.** *Agric. Biol. Chem.* 41(7): 1317-1319; 1977. (8 references)

The biodegradation of lindane and related compounds was studied *in vivo* in male Wistar rats and *in vitro* using rat liver supernatant. *S*-chlorophenyl -cysteines were treated with 1-BuOH/HCl, dried, and heated with TFA anhydride in CH_2Cl_2. Each of the derivatives showed a good gas chromatographic peak, and separation between isomers was satisfactory. Urine collected from rats treated i.p. with the test compounds was analyzed in the same manner. The 4-Cl-, 3,4-Cl_2-, 2,5-Cl_2-, 2,3,5-Cl_3-, and 2,4,5-Cl_3-phenyl mercapturic acids were identified as lindane metabolites, as was 2,4-DCPMA. A supposed intermediate, (36/45)-PCCHE, afforded 2,4-DCPMA as almost the only mercapturic acid-type metabolite. The composition of the *in vivo* (36/45)-HCCHE metabolites resembled that of the lindane metabolites. Somewhat different compositions of conjugates were obtained *in vitro*. The reactivity of lindane in this system was too low to afford any GSH conjugates. It is suggested that lindane is first metabolized *in vivo* by endoplasmic reticulum enzyme (microsomal fraction) before undergoing GSH conjugation in cytosol. PCCHE and HCCHE appear to also be modified to some extent by endoplasmic reticulum enzyme before undergoing GSH conjugation in cytosol. An overall mercapturic acids forming pathway for lindane is proposed.

78-0334. Nakagawa, M. ; Ando, M. (Agric. Chem. Res. Lab., Sankyo Co., Ltd., Yasucho 1041, Yasugun, Shigaken, Japan) **Metabolism of credazine, 3-(2′-methylphenoxy) pyridazine, in rats.** *Agric. Biol. Chem.* 41(10): 1975-1984; 1977. (22 references)

A single oral dose of credazine, 3-(2′-methylphenoxy) pyridazine-6-^{3}H, to male Wistar rats at 10 and 100 mg/kg was eliminated in 4 days and was metabolized through oxidative pathways. 3-(2′-Hydroxymethylphenoxy) pyridazine, 3-phenoxypyridazin -2′-yl-carboxylic acid, 3(2H)-pyridazinone and the sulfate of 3-(2′-methyl-4′- hydroxyphenoxy) pyridazine were identified as urinary metabolites. The tritium label was retained by more than 95% during metabolism. Among the metabolites the alcohol and carboxylic acid derivatives were found to be labile: the former isomerized to 10*H*-pyridazino [3,2-b][1,3] benzoxazinium hydroxide, and the latter decomposed to 3(2H)-pyridazinone and salicylic acid. Any enzymatic cleavage of the other bond of credazine and its metabolites was not evident.

78-0335. Demecko, J. ; Jaras, A. (Nat. Inst. Agrochem. Technol.,Bratislava, Czechoslovakia) **Trimorfamid - novy systemovy fungicid. [Trimorfamid - a new systemic fungicide.]** *Agrochemia (Bratislava)* 17(7): 205-206; 1977. (1 reference) (Slovak)

N-(Formamino -2,2,2-trichloroethyl) morpholine (proposed name "Trimorfamid") was found to act as a preventive and curative systemic fungicide in the form of an organic solvent emulsion to control the fungi *Erysiphe graminis* (with barley as a host plant), *Erysiphe cichoracearum*, a parasite infesting cucumbers, melons, tobacco etc. and other horticultural and viticultural pests. Preliminary toxicological tests have characterized Trimorfamid as a systemic fungicide with a presently acceptable degree of toxicity to warm-blooded animals. The active substance has an LD50 of 990 mg/kg for rats, while the LD50 of a 20% preparation for rats is 2900 mg/kg.

78-0336. Konecny, V. ; Varkonda, S.; Gather, S.; Steskal, R. ((Natl. Inst. Agrochem. Technol., Bratislava, Czechoslovakia)) **Pyridation - novy experimentalny insekticid. [Pyridathion - a new experimental insecticide.]** *Agrochemia (Bratislava)* 17(7): 207-209; 1977. (14 references) (Slovak)

O-ethyl- *O*-isopropyl- *O*-(5-methoxy- 1-methyl- 6-oxo-1H-pyridazin-4-yl) thiophosphate (proposed name

"Pyridathion"), a reddish-brown organophosphorus compound, was found to be a strong contact insecticide, acaricide, and ovicide suitable for the control of soil pests, specifically wire worms. The acute oral toxicity to Wistar rats is LD50 = 5 mg/kg and its dermal toxicity is LD50 = 11 mg/kg, which classifies the compound as highly toxic to warm blooded organisms and therefore limits its usefulness as a spray insecticide. The phytotoxicity in soil application (1-3 kg/ha) was not studied. The residual biological effect in the soil was 60% after 3 days and 80% after 8 weeks.

78-0337. Lakowicz, J. R. ; Hogen, D.; Omann, G. (Freshwater Biol. Inst., Univ. Minn., P. O. Box 100, Navarre, MN 55392) **Diffusion and partitioning of a pesticide, lindane, into phosphatidylcholine bilayers.** *Biochim. Biophys. Acta* 471(3): 401-411; 1977. (20 references)

The use of β-(11-(9-carbazole)- undecanoyl)- L-α-phosphatidylcholine, a carbazole labeled phospholipid, to determine the diffusion coefficient of a pesticide, lindane, in bilayers of dimyristoyl- L-α-phosphatidyl- choline; the lipid-water partition coefficient of lindane; and the lindane binding capacity of dimyristoyl- L-α-phosphatidylcholine bilayers were investigated. Measurement of the apparent quenching constant at various dimyristoyl phosphatidylcholine concentrations yielded a lipid-water partition coefficient for lindane of 9500, which is in agreement with the value of 8980 obtained by equilibrium dialysis experiments. Vesicles of dimyristoyl- L-α-phosphatidylcholine became saturated with lindane at a pesticide to lipid molar ratio of about 0.28. The results demonstrate the possibility of using the quenching of carbazole fluorescence to study the transport and partitioning of pesticides within biological membranes. This ability should prove useful in studies of the interactions of chlorinated hydrocarbons with cell membranes.

78-0338. Kaushal, M. ; Gupta, P. K. (Scientist Industrial Toxicology Res. Centre, Lucknow, India) **Endrin intoxication in normal and irradiated rats II. Lipid, phospholipid and cholesterol content.** *Bull. Environ. Contam. Toxicol.* 18(3): 355-360; 1977. (12 references)

Effects of the hydrocarbon pesticide endrin on lipids, phospholipids, and cholesterol content of normal and irradiated rats were investigated. One hundred twenty female albino rats were divided into four groups for the experiment: 1) control group; 2) rats given 10 mg/kg endrin, i.p.; 3) irradiated controls (900 R total dose from ^{60}Co); 4) rats given 10 mg/kg endrin, i.p., after irradiation. Four to six rats from each group were sacrificed at 2, 6, 12, and 48 hr after treatment, and all rats were fasted for 12 hr before sacrifice. Tables indicating total lipids, phospholipids, and cholesterol in mg/kg for each of the experimental groups and subgroups are presented along with statistics. The researchers concluded that exposure of rats to a single dose of endrin or radiation leads to an inhibition of total lipids and phospholipids with no change in cholesterol. The effect of endrin and radiation together was greater than would be expected from addition of their effects when administered separately. The mechanism of this synergism needs to be explored.

78-0339. De Lorenzo, F. ; Staiano, N.; Silengo, L.; Cortese, R. (Int. Cancer Res. Data Bank Program, Natl. Cancer Inst., NIH, Bethesda, MD) **Mutagenicity of diallate, sulfallate, and triallate and relationship between structure and mutagenic effects of carbamates used widely in agriculture.** *Cancer Res.* 38(1): 13-15; 1977. (18 references)

In this report of a comparison of the chemical structures with the mutagenic effects of three carbamates, evidence is presented that the 2-chloro-allyl group is responsible for the mutagenicity of diallate, sulfallate, and triallate. Diallate has been shown to be a carcinogen in mice, and the hazards of the use of this compound and of the related test compounds are stressed. The three thiocarbamate compounds were found to be mutagenic in the presence of a liver microsomal fraction on strains TA1535 and TA100. This indicates that the metabolic products of these thiocarbamates are causing base-pair substitutions. Since the 2-chloro-allyl group is common to the three mutagenic compounds but is not common to the other 17 tested but non mutagenic compounds, a metabolic derivative of this group is probably responsible for the mutagenic activity.

78-0340. Witschi, H. ; Kacew, S.; Hirai, K.; Cote, M. G. (Dep. Pharmacol. Fac. Med., Univ. Montreal, Montreal, Canada) **In vivo oxidation of reduced nicotinamide-adenine dinucleotide phosphate by paraquat and diquat in rat lung.** *Chem. Biol. Interact.* 19(2): 143-160; 1977. (37 references)

Studies were undertaken to measure directly the concentrations of NADPH and NADP in the lungs of rats injected with paraquat or diquat in order to determine if excessive NADPH depletion represents the mechanism of pulmonary paraquat toxicity. Within 60 min following iv injection of rats with 156 μmol/kg paraquat or 140 μmol/kg diquat a sharp drop was noted in the ratio of NADPH to NADP in the lung. This effect persisted for at least 24 hr. Exposure to 100% oxygen enhanced the toxicity of both compounds, while it did not substantially amplify changes in the NADPH/NADP ratio. Lungs retained the capability to synthesize adenine nucleotides de novo. Electron microscopic studies showed that both paraquat and diquat damage type I alveolar cells, but only paraquat produced type II cell lesions. Although bipyridylium herbicides produced acute oxidation of NADPH in vivo, there seems not to exist a straightforward relationship between this event and cell damage.

78-0341. Ishii, H. ; Suga, T.; Niinobe, S.; Inatsu, Y. (Tokyo Coll. Pharm., 1432-1 Horinouchi, Hachioji, Tokyo, 192-03, Japan) **Effect of 3-amino- 1,2,4-triazole on the formation of triglyceride in liver slice.** *Chem. Pharm. Bull.* 25(9): 2283-2286; 1977. (13 references)

The effect of 3-amino- 1,2,4-triazole (AT) on the formation of liver triglyceride (TG) was studied in vitro with liver slices from rats injected ip with AT before being sacrificed. The incorporation of ^{14}C-acetate into TG decreased about 45 percent (when compared to controls) in livers from rats that had received AT (1 g/kg). The incorporation of ^{14}C-palmitate into TG in AT injected rats did not differ from

that of the controls. Also in the livers from the AT group a decrease in the incorporation of ^{14}C-acetate into total fatty acid was observed. A 40% inhibition of TG ^{14}C-acetate incorporation was observed when AT was present at 50 mM in the incubation mixture, an inhibition which was found to be AT concentration dependent. It is hypothesized that the decrease of liver TG levels induced by AT may be due to the inhibition of fatty acid synthesis in the liver.

78-0342. Nakagawa, M. ; Kobayashi, H.; Kojima, S.; Uemura, A.; Uchiyama, M. (Fac. Pharm. Sci., Kumamoto Univ., Kumamoto, Japan) **Comparison of inhibitory actions of organophosphate on cholinesterase and lecithin-cholesterol acyltransferase in human plasma.** *Chem. Pharm. Bull.* 25(10): 2530-2534; 1977. (10 references)

The inhibitory actions of organophosphate pesticides on cholinesterase and lecithin-cholesterol acetyltransferase (LCAT) in human plasma were compared. The acetyltransferase in acetone powdered human plasma was inhibited 55, 60, and 97% by .001M sumithion (fenitrothion), DDVP (dichlorvos), and DFP, respectively. Human plasma cholinesterase was also inhibited at concentrations of DDVP ranging from 0.0000001 to 0.00001 M in vitro. The study suggests that the inhibitory action of organophosphate pesticides on the acetyltransferase in human plasma may be different from that on plasma cholinesterase.

78-0343. Greenberg, D. B. ; Last, J. A. (Davis, California) **Collagen biosynthesis by lung slices from rats administered paraquat, a fibrotic agent.** *Chest* 72(3): 400; 1977.

Paraquat injected ip into rats caused an elevation in the rate of collagen synthesis as measured by radioactive hydroxyproline determinations from hydrolysates of lung slices incubated with labeled proline. In vitro studies showed that lung slices from rats administered paraquat incorporated the same amounts of proline into total protein as did lung slices from control rats. However, it was observed that lung slices from the paraquat-treated group made more collagen than did lung slices from the uninjected group both in absolute terms (total counts per minute-cpm of hydroxyproline) and as a cpercentage of the total protein made (hydroxyproline cpm/total cpm in protein). The authors conclude that collagen synthesis is stimulated by paraquat (at the doses given) to a rate sufficient to cause pulmonary fibrosis. Further investigations are needed to discover the specific collagen type(s) that result from the paraquat stimulus.

78-0344. Louw, M. ; Neethling, A. C.; Percy, V. A.; Carstens, M.; Shanley, B. C. (Dep. Chem. Pathol., Univ. Stellenbosch, Tygerberg, South Africa) **Effects of hexachlorobenzene feeding and iron overload on enzymes of haem biosynthesis and cytochrome P450 in rat liver.** *Clin. Sci. Molec. Med.* 53(2): 111-115; 1977. (23 references)

Siderosis was produced in female Wistar rats by i.p. injections of iron/dextran over a period of 10-14 days. Starting 14 days after completion of the iron/dextran treatment, some of the rats were placed on diets containing 3 g/kg hexachlorobenzene (HCB). HCB was also fed to nonsiderotic rats, and a control group was given neither iron/dextran nor HCB. In the nonsiderotic group, HCB feeding led to a progressive decrease in liver uroporphyrinogen decarboxylase activity, which was accompanied by a progressive increase in δ-aminolaevulinate synthase activity. Cytochrome P450 concentrations were above normal throughout, but fell toward the end of the experiment. Similar but more marked changes were observed in the siderotic animals fed HCB. The fall in uroporphyrinogen decarboxylase activity occurred earlier and was significantly greater in these animals, whereas the increase in δ-aminolaevulinate synthase activity was consistently larger. The liver cytochrome P450 concentration also rose, but to a lesser extent than in the nonsiderotic rats. HCB-induced porphyria appears to be attributable to the inhibition or inactivation of hepatic uroporphyrinogen decarboxylase. Hepatic siderosis has a synergistic effect with HCB on this enzyme and may exert additional effects by promoting the turnover of cytochrome P450.

78-0345. Inman, C. B. E. ; Lockwood, A. P. M. (Dep. Oceanogr., Univ. Southampton, Southampton, England) **Some effects of methylmercury and lindane on sodium regulation in the amphipod *Gammarus duebeni* during changes in the salinity of its medium.** *Comp. Biochem. Physiol. [C]* 58(1): 67-75; 1977. (50 references)

The effects of an organochlorine pesticide (lindane) and an organometal (methylmercury) on sodium balance at low salinities and on changes in sodium uptake following changes in external salt concentration in the euryhaline amphipod *Gammarus duebeni* are considered. Significant reductions in hemolymph sodium concentrations were found in *Gammerus duebeni* exposed to sub-lethal concentrations of methylmercury or lindane in 2% sea water for 1 to 4 days. Such lindane-treated animals still had lowered sodium concentrations after a subsequent period of 7 days in clean 2% sea water. Prior treatment with sub-lethal concentrations of the pesticides resulted in delays of 80 to 120 minutes respectively (methylmercury or lindane) in the time required for active sodium uptake to be increased when transferred from 100 to 2% sea water, and also depressed maximal and steady state sodium transport rates.

78-0346. Rose, M. S. ; Smith, L. L. (Biochem. Mechanisms Sect., I.C.I. Central Toxicol. Lab., Alderley Park Nr. Macclesfield, Cheshire, England) **Tissue uptake of paraquat and diquat.** *Gen. Pharmacol.* 8(3): 173-176; 1977. (23 references)

In vivo and *in vitro* experiments in various species have shown that paraquat is accumulated by lung tissue to a much greater extent than is diquat. Paraquat accumulation by slices of rat lung is dependent upon energy production and upon the paraquat concentration in the incubation medium, and the process obeys saturation kinetics. The accumulation and retention of paraquat by lung is not related to any binding phenomenon. The only other tissue to accumulate paraquat

to any significant extent *in vivo* is kidney, whereas brain was the only other tissue to accumulate the pesticide to any significant extent *in vitro*. The system present in the lung for the accumulation of paraquat appears to differ from that which accumulates 5-hydroxytryptamine, and is probably present in the type I and type II alveolar epithelial cells. The cytoplasmic concentration of paraquat achieved in these cells will be very high, and the metabolic consequences that follow will include oxidation of NADPH, production of toxic oxygen radicals, and subsequent cell death. The role of this system in the functioning of the lung is unknown.

78-0347. Sahi, R. (Dept. Chem., V.S.S.D. College, Kanpur 208002, India) **Proton magnetic resonance studies on the interaction of DDT with indoles.** *Indian J. Chem.* 15A(3): 236-237; 1977. (17 references)

Formation of a charge-transfer complex by DDT with reverse axon protein has been suggested as the basis for DDT neurotoxicity. The formation of molecular complexes between DDT as acceptor and indole, 2-methylindole, and 3-methylindole (structural analogues of biologically active compounds) as donors was studied in solution using proton magnetic resonance spectroscopy. Equilibrium constants (L/mole), and chemical shifts of the acceptor protein in the pure complex (Hz) were 0.308 and 64.6, respectively, for indole; 28.0 and 60.6 for 2-methylindole; and 0.468 and 52.8 for 3-methylindole. Proton chemical shifts of complexed and uncomplexed acceptor molecules were found to change relative to one another in the presence of excess donor. These results support the proposed formation of a charge-transfer complex as the mode of action of DDT on the molecular level. Probable sites of interaction on the DDT molecule are discussed.

78-0348. Kumar, D. ; Bhattacharya, S. (Dep. Zool.,Visva-Bharati Univ., Santiniketan 731 235, India) **Reversibility of endrin inhibited α-amylase activity from fish liver.** *Indian J. Exp. Biol.* 15(10): 927-928; 1977. (12 references)

The main objective of the study was to determine the accumulative value of endrin responsible for the observed α -amylase inhibition in fish liver during 48 hours of exposure to the median lethal concentration and then to determine the possible means by which the inhibitory action could be reversed. It was found that hepatic α-amylase activity of *Anabas testudineus* was inhibited by exposure to endrin, and that this inhibition was concentration dependent and reversed by exposure to sodium ions. An attempt was made to reverse the effect of endrin pollution on α-amylase by introducing sodium ion exposure after endrin treatment. Endrin treated fish were removed to aquaria containing fresh water or sodium ion and exposed for another 48 hours. The loss of enzyme activity by endrin was markedly regained in the presence of sodium ion. By trying various concentrations of sodium ions for reversing the endrin effect, 1 ppm was found to be optimal.

78-0349. Chang, C. W. J. ; Nakamura, R. M.; Brooks, C. C. (Coll. Trop. Agric., Univ. Hawaii, Honolulu, HI) **Effect of varied dietary levels and forms of mercury on swine.** *J. Anim. Sci.* 45(2): 279-285; 1977. (20 references)

Mercury in the form of methylmercuric chloride or mercuric chloride was mixed into a basal ration and fed to pigs in the following concentrations: .5, 5.0, or 50.0 ppm. One lot was also fed a basal ration with 1 lb of raw fish per pig added daily. Characteristic clinical signs of mercury toxicosis with recumbency and death were noted in the pigs fed 50 ppm methylmercuric chloride. Gross lesions were seen for all levels of organic mercury, but only in the pigs fed 50 ppm of the inorganic form of mercury were such changes noted. Half the pigs were slaughtered and the others were mated. Neither teratogenic nor behavioral abnormalities were seen in the progeny. Gross necropsy examinations showed that various tissue samples contained more mercury in those fed the organic form than in those fed the same concentration of inorganic mercury. The possibility that selenium and other substances present in raw fish may have contributed to a reduction in mercurial toxicity is discussed. The feeding of diets containing .5, or 5.0 ppm organic mercury; .5, 5.0, or 50 ppm inorganic mercury; or raw marlin to gilts through growth and lactation had no effect on reproductive performance or normalcy of pigs born.

78-0350. Fontenot, J. P. ; Bovard, K. P.; Oltjen, R. R.; Rumsey, T. S.; Priode, B. M. (Virginia Polytech. Inst. and State Univ., Blacksburg, VA 24061) **Supplementation of apple pomace with nonprotein nitrogen for gestating beef cows. I. Feed intake and performance.** *J. Anim. Sci.* 45(3): 513-522; 1977. (12 references)

One hundred forty-two cows in a series of four trials were studied from approximately 12 wk prepartum to 12 weeks postpartum to assess the feasibility of supplementing apple pomace with nonprotein nitrogen (NPN) for the winter feeding of pregnant beef cows. Apple pomace with urea, biuret, or some combination thereof fed to the cows resulted in lowered feed consumption and increased weight loss when compared to diets consisting of corn silage with NPN or apple pomace with protein supplement. The apple pomace with NPN diet also resulted in the birth of small, deformed, or weak calves. In an effort to simulate the apple pomace diet, a group of cows fed corn silage and cobs with urea, corn oil, and a combination of pesticides similar to these found in apple pomace. This diet did not produce abnormal calves. Until the cause of the deleterious of the apple pomace with NPN diet are determined, this diet should not be used for gestating ruminants.

78-0351. Bovard, K. P. ; Rumsey, T. S.; Oltjen, R. R.; Fontenot, J. P.; Priode, B. M. (Virginia Polytechnic Inst. and State Univ., Blacksburg, VA 24061) **Supplementation of apple pomace with nonprotein nitrogen for gestating beef cows. II. Skeletal abnormalities of calves.** *J. Anim. Sci.* 45(3): 523-531; 1977. (13 references)

To further assess the effects of apple pomace with NPN fed to gestating beef cows, physical exams and x-ray studies were performed on 86 calves. Calves from mothers

fed the apple pomace with NPN diet had longer, thicker knee joints and delayed ossification, and had birth weights 5 to 10 lb less than calves fed apple pomace supplemented with cottonseed meal. When the dams were fed corn silage in combination with the NPN and cottonseed meal supplemented apple pomace diets the calves were indistinguishable. The dramatic effects of this experiment were unexpected, and further efforts are needed to explain the synergistic effects of apple pomace with NPN.

78-0352. Leger, R. G.; Millette, G. J. F. (Dep. Res., Benson et Hedges (Canada) Lt'ee, Montreal, P. Que.). **La resistance des vers de terre *Lumbricus terrestris* et *Allolobophora turgida* an fongicide captane 50 W.P. [The resistance of earthworms *Lumbricus terrestris* and *Allolobophora turgida* to captan 50 W.P.]** *Rev. Can. Biol.* 36(4): 351-353; 1977. (7 references) (French)

Aqueous 700, 1400, and 2800 ppm solutions of captan 50 WP were used to treat muck, Chicot, and Ste-Sophie soils in which two earthworm species, *Lumbricus terrestris* and *Allolobophora turgida*, were raised. After 42 days of treatment 95% of the *L. terrestris* and 100% of the *A. turgida* survived. Analysis of tissue extracts from exposed earthworms by gas chromatography did not detect captan. Because of the very high survival rate and the fact that captan was not detected in earthworm tissues, it was concluded that residues of captan in the soil are unlikely to harm earthworms.

78-0353. Oltjen, R. R. ; Rumsey, T. S.; Fontenot, J. P.; Bovard, K. P.; Priode, B. M. (U. S. Dept. Agricult., Beltsville, MD 20705) **Supplementation of apple pomace with nonprotein nitrogen for gestating beef cows. III. Metabolic parameters.** *J. Anim. Sci.* 45(3): 532-542; 1977. (19 references)

Metabolic parameters were assessed in gestating cows fed apple pomace or corn silage plus isonitrogenous and isocaloric quantities of cottonseed meal or nonprotein nitrogen (NPN) containing supplements in four trials; similar data were also obtained from steers during one metabolism trial. Ruminal volatile fatty acids (VFA), pH, and ammonia, plasma ammonia, and BIN were the parameters measured. Supplementary sources of nitrogen accounted for 70-90% of the total nitrogen in the diet. The apple pomace diet as compared with the corn silage diet resulted in greater molar percentages of acetic and valeric acid in the rumen ($p < 0.01$), lesser molar percentages of propionic, butyric, valeric, and isovaleric acids, ($p < 0.05$), and decreased ruminal pH. Cows and steers fed the urea supplement had lowered plasma concentrations of several essential amino acids. Blood mineral profiles in cows were similar regardless of the source of supplementary nitrogen. These results do not clearly account for the reproductive problems associated with the feeding of apple pomace with urea to pregnant cows, which has been previously reported; however, the reduced levels of ruminal branched chain VFA and essential amino acids in the serum observed in these cows may be indicative of a deficiency in the essential amino acids.

78-0354. Rumsey, T. S. ; Bovard, K. P.; Fontenot, J. P.; Oltjen, R. R.; Priode, B. M. (U. S. Dep. Agric., Beltsville, MD 20705) **Supplementation of apple pomace with nonprotein nitrogen for gestating beef cows. IV. Pesticide accumulation in cows.** *J. Anim. Sci.* 45(3): 543-550; 1977. (18 references)

Samples of fresh apple pomace collected in October, 1968, and apple pomace from October, 1967, and fed to pregnant cows during a feeding trial from mid-November, 1967 to April, 1968, were analyzed for dicofol (kelthane), tetradifon (tedion), DDT, DDD, and DDE. Pesticide residues in the fresh apple pomace ranged from 0.25 to 3.25 ppm for dicofol, 0.0 to .4 ppm for tetradifon, 0.5 to 7.35 ppm for DDT, 0.0 to .65 ppm for DDD, and .03 to .33 ppm for DDE. The stored apple pomace had pesticide residues of .36 to 1.16 ppm for dicofol, .07 to .94 ppm for tetradifon, 1.0 to 3.57 for DDT, .38 to .94 for DDD, and .3 to .74 for DDE. These ranges demonstrated the wide variation in pesticide intake during an apple pomace feeding period. Levels of pesticide residues in the fat depots of pregnant cows fed the apple pomace for 160 days were significant. Tetradifon, DDT, and DDD accumulated in fat tissues at similar rates: 29% as fast as DDE. Dicofol accumulated at rates 8% as fast as tetradifon. Total DDT (sum of DDT, DDD, and DDE) were highest in heart fat, intermediate in internal rib, caul, kidney, ruffle, and perianal fat, and lowest in brisket and external fats. All levels fell below the 5 ppm tolerance level.

78-0355. Fries, G. F. ; Marrow, G. S. (USDA, Beltsville, MD 20705) **Distribution of hexachlorobenzene residues in beef steers.** *J. Anim. Sci.* 45(5): 1160-1165; 1977. (14 references)

The distribution of hexachlorobenzene residues in beef steers was investigated. The steers were fed a complete diet containing 2 ppm each of HCB and DDE. Steers were slaughtered at 2 weeks or 4 weeks after feeding started. Significant differences in HCB residues among the fat depots measured were found. Levels in pericardial fat were lower and in perirenal fat higher than in omental, mesenteric, and subcutaneous fats. Differences were greater at 2 and 4 weeks than at 6 weeks. No significant differences in residue levels in fat from nine retail cuts were noted. Residue levels in fat from heart and kidney did not differ greatly from levels in the fat of retail cuts, but levels in fat from liver were about five times higher. Removing spearable fat significantly increased the residue levels of the remaining fat of the retail cuts, but the increase was too small to be of practical importance. Patterns of DDE distribution were similar to those of HCB, but the levels of DDE were only 90% of those of HCB.

78-0356. Deitrich, R. A. ; Bludeau, P.; Stock, T.; Roper, M. (Univ. Colorado Sch. Med., Dep. Pharmacol., Denver,

CO 80262) **Induction of different rat liver supernatant aldehyde dehydrogenases by phenobarbital and tetrachlorodibenzo -*p*- dioxin.** *J. Biol. Chem.* 252(17): 6169-6176; 1977. (18 references)

2,3,7,8-tetrachlorodibenzo -*p*- dioxin (TCDD) was tested as an inducer of aldehyde dehydrogenase in rat liver. TCDD (100 g/kg) in dioxane was injected into adult Long-Evans rats of phenobarbital responding (RR) and nonresponding (rr) strains. The livers were taken at various times thereafter and tested for aldehyde dehydrogenase. TCDD was found to be a potent inducing agent for the enzyme in rat liver supernatant fraction in both the RR and rr lines. The induction was confined to an enzyme found in the supernatant fraction of liver. The TCDD (T)- and phenobarbital (0)-induced enzymes were purified and compared. The 0 enzyme precipitated at 60% saturation with ammonium sulfate, while the T enzyme did not precipitate until 70% saturation with ammonium sulfate was reached. The 0 enzyme would not bind to a DEAE-cellulose column at 1 mM phosphate, pH 7.4, whereas the T enzyme bound strongly. Both enzymes bound to CM-cellulose and were eluted in two peaks at about the same ionic strength, and, in the case of the T enzyme, reapplication of either peak resulted in elution of two peaks again. Heat denaturation and antibody studies showed the two T enzymes to be similar if not identical, suggesting that a reversible denaturation of the enzyme occurs. The 0 enzyme had a Km for acetaldehyde at pH 7.4 of about 2.2 mM, whereas the T enzyme had a Km of about 26 mM. The molecular weight of the 0 enzyme was about 122,000, and that of the T enzyme was about 72,000. The 0 enzyme appeared to polymerize on storage to a higher molecular weight, although it remained active.

78-0357. Colavito, M. ; Glover, T. J.; Kuhr, R. J. (Biol. Dept., Hutchinson Hall, River Campus, Univ. Rochester, Rochester, NY 14627) **Resistance of *Drosophila melanogaster* to DDT.** *J. Econ. Entomol.* 70(5): 539-543; 1977. (16 references)

Experiments were performed to investigate the genetic response of *Drosophila melanogaster* to DDT. A wild population of *Drosophila melanogaster* Meigen exposed to LD_{20-40} levels of DDT for six generations (Geneva-R-Low Strain) developed over 1000x resistance to DDT. Exposure to higher selection pressures of DDT for fewer generations (Geneva-R-High-Strain) also resulted in virtual immunity to DDT. Selection of a laboratory-reared strain at LD_{80} of DDT for four generations (TK-I-R strain) produced male flies with a 40 x resistance to DDT, while females showed an 80 x increase in resistance. TK-I-R flies were cross resistant to chlorpyrifos (10 x) and possibly to methomyl (2-3 x), but no cross resistance to either insecticide occurred in either the Geneva-R-Low or Geneva-R-High strains. These results indicate that the development of DDT resistance in the Geneva-R-High line is associated with a semidominant autosomal factor on chromosome number 2, with auxilliary factors also exhibiting semidominance on chromosome numbers 1 and 3.

78-0358. Georghiou, G. P. ; Taylor, C. E. (Univ. California, Riverside, CA 92521) **Operational influences in the evolution of insecticide resistance.** *J. Econ. Entomol.* 70(5): 653-658; 1977. (5 references)

The influence of operational factors on the frequency of alleles which confer resistance has been calculated with the aid of a computer. Lower insecticide dose levels, higher selection thresholds, alternating selection schedules, and observance of refugia are potential deterrents of rapid selection. The influence of these factors is enhanced in the presence of reproductive disadvantage in resistant genotypes. (Author abstract by permission)

78-0359. Bourquin, A. W. (U. S. Environ. Prot. Agency, Environ. Res. Lab., Gulf Breeze, FL 32561) **Effects of malathion on microorganisms of an artificial salt-marsh environment.** *J. Environ. Qual.* 6(4): 373-378; 1977. (16 references)

Laboratory salt-marsh environments were treated with malathion, an organophosphate insecticide, and aerobic heterotrophic bacteria were monitored to determine changes in their microbial ecology. Several physiological activities were assayed in both treated and untreated controls; however, no reliable trends in numbers of these microorganisms were detected. On the other hand, populations of malathion sole-carbon-degrading bacteria increased significantly with increasing treatment levels and in the sediments with repeated treatment. Malathion cometabolizing bacteria increased significantly over the control systems in the water column with increasing treatment levels. Although numbers of malathion-degrading bacteria increased with higher treatment levels or frequency of treatment, these changes had no effect on the total numbers of bacteria from the water or sediment. When an organochlorine insecticide, mirex, was used to treat the ecosystems, essentially no changes in the bacterial populations were detected. (Author abstract by permission)

78-0360. Madaric, A. ; Fellegiova, M. (Res. Inst. Hyg., CSSR, 882 01 Bratislava, Czechoslovakia) **Distribution of ^{14}C-lindane in Japanese quail using autoradiography of whole body sections.** *J. Environ. Sci. Health* B12(4): 245-250; 1977. (4 references)

To assess the distribution of lindane in quail, 45 day-old male Japanese quail were given single oral doses of 10 μCi ^{14}C-lindane. Animals were killed 3, 6, 16, 48, and 72 hr after application, and frozen sections were prepared and examined radiographically. Lindane rapidly distributed throughout the birds, especially in the fatty tissues. Within 72 after application, no labeled lindane could be detected. The results of this study demonstrate that there are no significant differences between the velocities of lindane excretion in Japanese quail and in rats as reported in the literature.

78-0361. Bakke, J. E. ; Price, C. E. (Metab. Radiat. Res. Lab., Agr. Res. Serv., U. S. Dept. Agric., Fargo, ND 58102) **Metabolism of crufomate [4-*tert*-butyl- 2-chlorophenyl-methyl methylphosphoramidate)] by the rat.** *J. Environ. Sci. Health B* 12(4): 251-260; 1977. (3 references)

Ten male rats were given a single oral 5-mg dose of crufomate (I) in ethanol, and the urine and feces were collected at 24-hr intervals thereafter. The excreta and total carcasses were analyzed using liquid scintillation counting, column chromatography, thin-layer chromatography, derivatization, and gas-liquid chromatography. Fifteen metabolites of crufomate were identified in the excreta of the treated rats. Compound I was not detected in either the urine or feces. The metabolic reactions observed were *N*- and *O* -demethylation, oxidations of the *t*-butyl moiety, replacement of the H-N-CH_3 with an OH moiety, hydrolysis of the phosphoramidate moiety to yield phenol, conjugation with glucuronic acid, and combinations of these reactions. No ring dehalogenation or ring substitution was observed.

78-0362. Pekas, J. C. ; Bakke, J. E.; Giles, J. L.; Price, C. E. (Metabolism and Radiation Res. Lab., Agric. Res. Service, U. S. Dept. Agric., Fargo, ND 58102) **Rat intestinal metabolism of crufomate (4-*tert*-butyl- 2-chlorophenyl methyl methylphosphoramidate).** *J. Environ. Sci. Health B* 12(4): 261-268; 1977. (5 references)

The potential of the intestine to metabolize crufomate was investigated, and an attempt was made to identify metabolites not found in previous studies. An in vitro, everted intestinal sac preparation exposed to ^{14}C-crufomate was used in this experiment. The metabolites were traced and quantified by radioanalysis, and identified with GLC and mass spectrometry. These metabolites were 4-*tert*-butyl- 2-chlorophenyl methyl phosphoramidate (25%), 2-chloro-4(2-hydroxy- 1,1-dimethylethyl) phenyl methyl methylphosphoramidate (19%), 2-[3-chloro-4-[[(methoxy)(methylamino) phosphinyl]oxy]phenyl]- 2-methylpropionic acid (2%), 4-*tert*-butyl- 2-chlorophenol (0.8%) and its glucuronide (6%), and the aromatic glucuronide of 2-chloro-4 (2-hydroxy-1,1-dimethylethyl) phenol (1%). These intestinal metabolites may represent precursory stages in the overall metabolism of crufomate.

78-0363. El-Sebae, A. H. ; Soliman, S. A.; Elamayem, M. A.; Ahmed, N. S. (Plant Protect, Dep., Fac. Agr., Alexandria Univ., Alexandria, Egypt) **Neurotoxicity of organophosphorus insecticides Leptophos and EPN.** *J. Environ. Sci. Health B* 12(4): 269-288; 1977. (25 references)

Leptophos (30% E.C.) and EPN were administered in single oral doses to six female chickens, two crossbred lambs, and adult white mice. EPN was also administered to white mice and the effects of Leptophos, EPN, chlorpyrifos, phosfolan, and stirophos were determined in vitro on mouse brain acetylcholinesterase (AChE), neurotoxic esterase, and monoamine oxidase. Phosfolan, chlorpyrifos, and stirophos, when applied at sublethal doses to white mice, did not induce any delayed neurotoxic effects, whereas sublethal and lethal oral doses of leptophos and EPN produced a delayed neurotoxic ataxia in mice. All five pesticides were inhibitors of cholinesterase, but only Leptophos and EPN were potent inhibitors of neurotoxic esterase and monoamine oxidase in the mouse brain. Sublethal doses of Leptophos and EPN caused delayed neurotoxic ataxia in chickens and sheep. It is suggested that the phosphonate ester configuration of EPN and Leptophos has a specific mode of toxic action which is located primarily in the central nervous system. These agents may inhibit postganglionic sympathetic neurons, thus resulting in chronic paralytic effects.

78-0364. Singh, R. ; Iyengar, L.; Prabhakara Rao, A. V. S. (Environ. Eng. Lab., Civil Engin. Dept., Indian Inst. Technol, Kanpur, India) **Effect of chlorinated hydrocarbons (insecticides) on fermentation processes.** *J. Ferment. Technol.* 55(3): 281-284; 1977. (10 references)

This study deals with the results of the effect of chlorinated hydrocarbons on the formation of ethyl alcohol and citric acid by *Saccharomyces cerevisiae* and *Aspergillus niger* , respectively. The study showed that chlorinated hydrocarbons inhibited the fermentation process in *A. niger* and *S. cerevisiae.* Production of citric acid by *A. niger* was reduced by 40-60% as compared to controls in the presence of heptachlor, endrin, dichlorodiphenyltrichloroethane, and lindane (40 μg/ml). Similar inhibition patterns were also noted on the formation of ethyl alcohol by *S. cerevisiae.* The initial steps of fermentation do not seem to be affected by chlorinated hydrocarbons, as sugar utilization is not inhibited by these compounds.

78-0365. Jarvinen, A. W. ; Hoffman, M. J.; Thorslund, T. W. (U. S. Environ. Prot. Agency, Environ. Res. Lab., Duluth, MN 55804) **Long term toxic effects of DDT food and water exposure on fathead minnow (*Pimephales promelas*).** *J. Fish Res. Board Can.* 34(11): 2089-2103; 1977. (50 references)

Fathead minnows (*Pimephales promelas*) were exposed during a partial chronic toxicity test to two DDT concentrations in the water, one in the diet, and combinations of water and diet for 266 days through a reproductive period of their life cycle. Tissue residue analyses were performed at present intervals throughout the exposure and also on embryos, larvae at hatch, and 30- and 60-day progeny. The contribution of DDT from each source was monitored with gas chromatography and liquid-scintillation techniques. The fish were fed a diet of clams that had accumulated ^{14}C-DDT when exposed at a DDT water concentration similar to that in the high fish exposure. Higher total DDT tissue residues were accumulated from the water than diet. Residues contributed by dietary DDT were additive to those from the water. Mean concentration factors were 1.2 for the diet and 100.000 for the water. Fish exposed to DDT in both water and diet had higher mortality rates than those exposed to only one or the other of these sources. DDT in the diet significantly reduced the probability of survival of the text fish ($P = 0.025$). Estimated maximum acceptable toxicant concentrations for DDT are 0.9 μg/l for fish exposed to DDT in the water only and 0.4 μg/l for fish exposed to DDT in both water and diet. Embryo residue levels and larval mortality rates were about twice as great for those from parent fish that had been exposed to DDT in both the water and diet as for those from parent fish exposed to only DDT in the water.

78-0366. Fowler, B. A. ; Hook, G. E. R.; Lucier, G. W. (Lab. Environ. Toxicol. Pharmacol., Natl. Inst. Environ. Health Sci., Research Triangle Park, NC) **Tetrachlorodibenzo-*p*-dioxin induction of renal microsomal enzyme systems: ultrastructural effects on pars recta (S_3) proximal tubule cells of the rat kidney.** *J. Pharmacol. Exp. Ther.* 203(3): 712-721; 1977. (31 references)

This study was undertaken to measure the level and duration of TCDD induction of renal microsomal enzyme systems and to correlate these changes with ultrastructural alterations in renal proximal tubule cells of the same animals. Renal dissection studies were also performed to evaluate the degree of microsomal induction in the medulla, outer strip of the medulla, and cortex of kidneys from TCDD-treated animals. The results of the study indicate that TCDD induction of renal microsomal enzyme activities is associated with proliferation of SER in a manner similar to that known for hepatocytes. Primary concentration of SER proliferation in one proximal tubule cell type suggests that the induction process is not uniformly distributed within the nephron. The significance of this information rests in an increased understanding of renal detoxification systems by combined ultrastructural and biochemical criteria.

78-0367. Loose, L. D. ; Pittman, K. A.; Benitz, K. F.; Silkworth, J. B. (Inst. Comparative and Human Toxicol., Albany Med. Coll., Albany, NY 12208) **Polychlorinated biphenyl and hexachlorobenzene induced humoral immunosuppression.** *J. Reticuloendothel. Soc.* 22(3): 253-271; 1977.

Studies were conducted to evaluate the influence of dietary ingestion of PCB (or HCB) on antibody (Ab) production and immunoglobulin concentrations. Male Balb/c mice used in the experiments were fed food and water ad libitum, with 167 ppm Arochlor 1242 or HCB in the food. Analyses of tissue levels of the chemicals and histopathology of select lymphoid tissues and reticuloendothelial organs were made concurrently with measurements of immunologic parameters to relate tissue concentration and morphology to functionality. After six weeks, a 2-fold reduction in peak primary splenic Ab PFC (plaque-forming cells) in response to SRBC was noted, but there was no delay in response time. All Ig levels measured in the primary response were decreased; serum IgA levels were consistently 40 to 80 mg/dl lower than control values, and serum IgA was more profoundly reduced in HCB than in PCB treated mice. During secondary challenge with SRBC 2 wk after the primary challenge control mice elicited a maximum response of 133 PFC/10^6 spleen cells versus 52 PFC/10^6 in PCB treated mice and 79 PFC/10^6 in HCB treated mice. These data clarify the immunosuppressive effect of PCB and HCB in mice; it remains to be established whether functional change in the lymphoid and reticuloendothelial organs is a more sensitive indicator of toxicity than pathologic alteration.

78-0368. Matschke, G. H. ; Fagerstone, K. A. (Denver Wildlife Res. Cen., US Fish and Wildlife Service, Denver, CO) **Effects of a new rodenticide, benzenesulfonic acid hydrazide, on prenatal mice.** *J. Toxicol. Environ. Health* 3(3): 407-411; 1977. (5 references)

The potential teratogenic or embryotoxic effects of the rodenticide benzenesulfonic acid (3-amino- 2,4,6-trichlorophenyl) methylene) hydrazide (DRC) when administered orally to pregnant mice were assessed. DRC was administered by gavage to pregnant BALB/c mice at five different dose levels (5.5, 28.0, 42.0, 62.0 or 94.0 mg/kg) at days 8, 9, 10, 11, 12 and 13 of gestation. Surviving females were sacrificed at day 18. No significant differences were found between treated mice and controls, in the number of weight of five fetuses, or in the ratio of male to female fetuses. The percentage of live fetuses was significantly lower ($p < 0.01$) for treated dams at the 62 mg/kg dose level. These results indicate that DRC is embryotoxic at doses of 62 mg/kg or higher, and is not teratogenic.

78-0369. Robinson, C. P. ; Smith, P. W. (Health Sci. Cen., Univ. Oklahoma, Oklahoma City, OK) **Lack of involvement of monoamine oxidase inhibition in the lethality of acute poisoning by chlordimeform.** *J. Toxicol. Environ. Health* 3(3): 565-568; 1977. (10 references)

To assess the significance of monoamine oxidase (MAO) inhibition in the lethality of acutely administered chlordimeform, the effects of selectively depleting serotonin of norepinephrine (NE) and administering a directly acting α-adrenergic antagonist were studied. Thirty-six day old male Sprague-Dawley rats weighing 110-135 g were used in these experiments. One hundred mg/kg of *p*-chlorophenylalanine (decreases brainstem serotonin to undetectable levels) administered 3 days before chlordimeform and 500 mg/kg DL-α-methyl-*p*-tyrosine (selectively depletes NE from rat brain) admininistered 20 hr prior to chlordimeform decreased chlordimeform hyperexcitability. One mg/kg of phenylephrine (stimulates central adrenergic receptors) administered just after chlordimeform greatly increased the excitatory effects of chlordimeform; however, it also caused marked stimulation when administered alone. None of the treatments influenced the LD50 of chlordimeform. These studies indicate that chlordimeform lethality does not result from stimulation of α-adrenergic receptors nor from inhibition of MAO.

78-0370. Feuer, G. ; Balazs, T.; Farkus, R.; Ilyas, M. S. (Dept. Clin. Biochem., Univ. Toronto, Toronto, Ontario, Canada) **Effect of 2-chloroethanol on hepatic microsomal enzymes in the rat.** *J. Toxicol. Environ. Health* 3(3): 569-576; 1977. (21 references)

The effect of 2-chloroethanol (CET) on the activities of hepatic microsomal enzymes is assessed. Albino Wistar rats weighing 105-160 g were administered CET, sc, at 0-20 mg/kg daily for 7 days. Rats were sacrificed, and microsomal liver homogenates were prepared and analyzed for activities of aminopyrine, coumarin 3-hydroxylase, glucose-6-phosphatase and inosine diphosphatase; protein content was determined. In rats given the 20 mg/kg dose, a significant ($p < 0.05$) reduction in the activities of these enzymes, except

for inosine diphosphatase, was noted. In rats given a 3 or 10 mg/kg dose, a trend in the inhibition of drug metabolism was also observed. A single dose of 50 mg/kg caused no apparent change in enzyme activity. It is apparent that CET causes impairment of drug metabolizing enzymes and phosphatases in the rat liver. The mechanism of action, perhaps mediated through 2-chloroacetaldehyde intermediate, has yet to be established.

78-0371. Murnik, M. R. ; Nash, C. L. (Dep. Biol. Sci., West. I11. Univ., Macomb, IL) **Mutagenicity of the triazine berbicides atrazine, cyanazine, and simazine in *Drosophila melanogaster.*** *J. Toxicol. Environ. Health* 3(4): 691-697; 1977. (23 references)

Assays for dominant lethal mutations, sex-linked recessive lethal mutations, and chromosomal breakage, nondisjunction and loss were performed on *Drosophila melanogaster* males treated by injection or by larval feeding of the herbicides atrazine, cyanazine, or simazine. The three herbicides significantly increased the rate of apparent dominant lethals, but this reduction in egg hatch was perhaps due to physiologic toxicity to the sperm. Atrazine significantly increased X-linked recessive lethals and X or Y loss after treatment by larval feeding. The injection of simazine elevated X-linked lethals, whereas treatment by larval feeding did not. None of these herbicides significantly increased partial loss of the Y chromosome nor sex chromosome nondisjunction. Much larger experiments are needed to determine with confidence the mutagenic potential of these herbicides.

78-0372. Kolaja, G. J. (Comp. Pathol. Surg. Branch, Vet. Med. Div., Biomed Lab., Chem. Syst. Lab., Aberdeen Prov. Ground, MD) **Effects of DDT on eggshell quality and calcium adenosine triphosphatase.** *J. Toxicol. Environ. Health* 3(4): 699-704; 1977. (23 references)

The effect of chronic exposure to DDT on the activity of eggshell gland Ca-ATPase in vivo was studied, and the relation of changes in enzyme activity to parameters of eggshell quality was determined. Adult mallard ducks were fed a diet containing 50 ppm DDT for 6 months. This ingestion resulted in production of eggshells that were significantly thinner and lighter than those of controls. Total calcium of thinned eggshells was also reduced. However, calcium per gram of eggshell was not changed, indicating that other eggshell constituents were not incorporated as well. Calcium adenosine triphosphatase activity in the microsomal fraction of eggshell gland epithelium was assayed in control and DDT-fed ducks. Enzyme activity in DDT-fed ducks was reduced to 65% of control. Since Ca-ATPase is associated with calcium transport, it is suggested that enzyme inhibition may be responsible for decreased eggshell weight and thickness. Electron microscopic evaluation showed elements of the plasma membrane, including cilia and microvilli, as well as rough and smooth endoplasmic reticulum. Inhibition of calcium transport at the plasma membrane of mucosal epithelium is proposed as a possible mechanism of DDT-induced eggshell thinning.

78-0373. Talamantes, F. ; Jang, H. (Div. Nat. Sci. Oakes Coll., Univ. Calif., Santa Cruz, CA) **Effects of chlordane isomers administered to female mice during the neonatal period.** *J. Toxicol. Environ. Health* 3(4): 713-720; 1977. (16 references)

This study investigated the effects of neonatal chlordane administration on body growth and endocrine development in female mice. Mice which received 0.075 or 0.15 mg of α or γ chlordane on day 2, 3, and 4 of life had depressed growth rates depending on the concentration or the type of isomer used. Eye and vaginal opening in the neonatally treated mice were delayed to varying degrees, depending on which isomer was used. The overall effects noted in the neonatally treated mice did not reflect a dose-related response.

78-0374. Hansen, D. J. ; Schimmel, S. C.; Forester, J. (U. S. Environ. Res. Lab., Gulf Breeze, FL) **Endrin: effects on the entire life cycle of a saltwater fish, *Cyprinodon variegatus*** . *J. Toxicol. Environ. Health* 3(4): 721-733; 1977. (21 references)

Sheepshead minnows were exposed to endrin as embryos and through maturation and spawning. Exposure continued through development and hatching of second-generation embryos. Growth and survival of young fish were monitored. Average exposure concentrations were 0, 0.027, 0.077, 0.12, 0.31, and 0.72 μg/liter. Embryos exposed to 0.31 and 0.72 μg/liter hatched early. All fry exposed to 0.72 μg/liter died by day 9 of exposure. AT 0.31 μg/liter fry were initially stunted and some died. Survivors seemed unaffected until maturity, at which time some females died during spawning. Fewer eggs were fertile, and survival of exposed progeny decreased. No significant effects were noted throughout this fish's life cycle at an exposure of 0.12 μg/liter. Four week old juvenile fish accumulated 2,500 times the concentration of endrin in the exposure water; adults, 6,400 times; and their eggs, 5,700 times. The specific application factor ranged from 0.35 to 0.91. This is the first toxicity test carried out through the entire life cycle of an oviparous estuarine fish. Data demonstrate that there is little difference between endrin concentrations that produce acute effects and concentrations that do not affect the fish in chronic exposures lasting four or more weeks.

78-0375. Matschke, G. H. ; Fagerstone, K. A. (Sect. Mammals, Denver Wildl. Res. Cent., U.S. Fish and Wildl. Serv., Denver Fed. Cent., Denver, CO) **Teratogenic effects of 6-aminonicotinamide in mice.** *J. Toxicol. Environ. Health* 3(4): 735-743; 1977. (12 references)

The teratogenic potential of single oral doses of 6-aminonicotinamide (6-AN) was studied in mice. Mice of the BALB/c strain were given single oral doses of 1, 17, 34, 51, or 136 mg/kg on one of days 8 to 13 of gestation. Fetuses were examined on day 18 post coitum, or allowed to go to term and examined 2 days after birth. Dam weights were significantly reduced at dose levels of 17 mg/kg. These same dose levels caused a significant decrease in litter size and in mean fetal weight. They also caused an increase in the num-

ber of resorptions. The most frequent visceral anomalies were hydrocephalus and cleft palate, and these were dose dependent. Skeletal anomalies were also dose dependent. The fetus was most susceptible on days 8 to 10 post coitum. At doses of 34 mg/kg and greater a significant increase in the ratio of female to male fetuses was noted. Surviving 2 day old pups had few visceral anomalies, but skeletal anomalies were more frequent. Because of its teratogenic properties, it would be difficult to register 6-AN for use against rodents or as a broad-spectrum rodenticide for use in agricultural crop areas.

78-0376. Hay, A. (Zoological Society, London, England) **Identifying carcinogens.** *Nature* 269(5628): 468-470; 1977.

Problems associated with the identification of carcinogens are discussed. Because animal studies are expensive and time consuming, reliable short-term tests such as the Ames test and Styles cell transformation test are used for initial screening. It seems expecially worthwile to screen compounds which are similar in structure to known carcinogens. One such compound is TCDD (dioxin). Studies indicate that TCDD is not mutagenic in bacterial cell systems, but one animal study has linked TCDD with carcinomas of the skin, kidneys, and liver, and with angiosarcomas. Further studies on the carcinogenicity of TCDD are underway.

78-0377. Evans, W. C. (Dep. Biochem., Univ. Coll. North Wales, Bangor, Gwynedd, Wales) **Biochemistry of the bacterial catabolism of aromatic compounds in anaerobic environments.** *Nature* 270(5632): 17-22; 1977. (59 references)

The biochemical mechanisms involved in the bacterial catabolism of aromatic compounds in anaerobic environments are reviewed. These mechanisms include photometabolism (*Athiorhodaceae*), nitrate respiration (*Pseudomonas* and *Moraxella* sp.), and methanogenic fermentation (a consortium), in which the benzene nucleus is first reduced and then cleaved by hydrolysis to yield aliphatic acids for cell growth. These same mechanisms can be used by microbial communities to catabolize man-made pollutants. Many factors are concerned in the degradation of organic compounds. All compounds are exposed to physico-chemical forces and biological agents capable for causing chemical change in the biosphere. Dilution processes and time eventually ensure that conditions are created for these factors to operate. Although many useful pesticides are developed empirically, their mode of action usually depends on a selective interference with some fundamental cellular process. Many of these foreign chemicals are degraded more rapidly by a mixed adapted community of soil microorganisms than by any of the freshly isolated individual members of the group. For example, many chlorinated hydrocarbon pesticides under suitable biologically active anaerobic conditions are degraded better by a mixture of organisms, as are compounds such as dalapon and asulam under aerobic conditions. Co-metabolism, enzyme induction, transfer of metabolic plasmids, mutation leading to the evolution of enzymes with new specificiaties and activities, and microbial interactions are among the known stratagems used to degrade organic chemicals by microbial communities.

78-0378. Konno, N. ; Kinebuchi, H. (Sch. Publ. Health, Fukushima Pref. Medical College, Fukushima, Japan) **[Concentration of phosvel in blood and body fat of hens following a single oral administration.]** *Nippon Koshu Eisei Zasshi (Jpn. J. Publ. Health* 24(10): 607; 1977. (Japanese)

Each of 33 white Leghorn hens, 24 months of age and with an average body weight of 1.94 kg, was forcibly given phosvel (leptophos, purity 86.1%) dissolved in salad oil p.o. The dose rates were 250 mg/kg for 15 hens and 50 mg/kg for 15 hens, the remaining 3 hens being killed before the experiment. Groups of three hens each were sacrificed at 1, 3, 6, 12, and 24 hr. after administration to determine phosvel concentratinos in blood and body fat. The results were for averages of three hens. The phosvel concentration in blood increased rapidly within 1-3 hr to a maximum, then declined rapidly within 24 hr, and became less than 2.0 ppb at both 250 and 50 mg/kg). The concentration in body fat attained a peak after 9-11 hr (8.6 ppm at 250 mg/kg and 2.5 ppm at 50 mg/kg), then the concentration decreased gradually to 6.5 ppm at 250 mg/kg and 11.3 ppm at 50 mg/kg 24 hr after administration. It was concluded that although phosvel was absorbed rapidly into blood, its residual time in blood seemed very short.

78-0379. Ando, M. ; Wakisaka, I. (Dep. Environ. Health, National Inst. Environ., Pollution Res., Tokyo, Japan) **[Analysis of the action of cadmium on the metabolism of DDT.]** *Nihon Koshu Eisei Zasshi (Jpn. J. Public Health* 24(10): 711; 1977. (Japanese)

The action of minute amounts of cadmium on the metabolism of DDT injected intraperitoneally in male Wistar rat was studied; the amounts of cadmium were 0, 0.6, 1.2, and 2.4 mg/kg body weight. Upon adopting the two compartment mammillary model it was presumed that in the early stage of cadmium administration the metabolic activity of the liver was inhibited. According to the determination of DDT in organs, it was found that the concentration of DDT in the liver was larger than in controls, suggesting an increase in the component other than neutral fat in the liver. This fact coincided with the increase in serum cholesterol upon administration of cadmium. It was found that the inhibitory action of cadmium on the drug metabolizing enzyme system showed a dose-response relationship. It was concluded that at the initial stage of administration cadmium inhibits the drug metabolizing enzyme system and simultaneously increases the lipid content of the liver, thus increasing the DDT concentration in the liver.

78-0380. Terayama, K. ; Taneichi, F.; Homma, H.; Kawarabayashi, T.; Takakuwa, E. (Sch. Hyg., Asahikawa Med. Coll., Asahikawa, Hokkaido, Japan) **[Examination of the toxicity of heavy metals and pesticides by myxomycetes.]** *Nihon Koshu Eisei Zasshi (Jpn. J. Publ. Health)* 24(10): 715; 1977. (Japanese)

By using Kamiya's double chamber method, a material at several concentrations was contracted with a myxomycete (*Physarum polycephalum*) to see the motive

force and change of membrane potential, as well as the survival time of the slime mold after the disappearance of motive force. It was found that the effect of heavy metals on the survival time appears at a constant concentration. In case of $HgCl_2$, the survival time was shortened at more than 0.0002 w/v %, and no restoration was found after removing $HgCl_2$. The threshold values thus found were 0.001% for $CdCl_2$, 0.002% for lead acetate, and 0.004% for copper (II) sulfate. The value of the LD50 p.o. for heavy metals in rats showed a linear relationship with the threshold value of immobilizing the slime mold. In spite of the different modes of toxic action of heavy metals, pesticides, and food colorings, the change in cell membrane of the slime mold intervenes between the toxicity and the response of the slime mold. It will be possible to presume the mammalian LD50 from the threshold value to immobilize the slime mold. Analogous correlation was found for EPN, phosvel, dichlorvos, and fenthion.

78-0381. Kudo, Y. ; Nanamura, I.; Nishida, N. (Sch. of Hyg., St. Marianna Med. Coll., Kawasaki, Kanagawa, Japan) **[Erythrocytic cellular change in peripheral blood of rabbits administered several pesticides now in use.]** *Nippon Noson Igakkai Zasshi (J. Japanese Assoc. of Rural Medicine)* 26(3): 326-327; 1977. (Japanese)

The change in numbers of reticulocytes (Rets.) and punctate basophilic erythrocytes in peripheral blood of rabbits after subcutaneous injection of several pesticides now in use was examined. The pesticides used were *m*-tolyl, *N*-methylcarbamate (MTMC), methomyl, chlordimeform, chlorobenzilate, thiophanate-methyl, *p*-nitrophenyl 2,4,6-trichlorophenyl ether, and butachlor. Two levels of dosage were applied: (1) one tenth of LD50 (p.o.) once a day for five consecutive days (suspended in water), and (2) one hundredth and two hundredths amount of LD50 (p.o.) once a day for 16 consecutive days (suspended in olive oil). The pesticides in (1) were commercial formulations and those in (2) were technical material. More marked increase of Rets was observed in rabbits' blood which were given commercial formulations of chlorobenzilate, thiophanate-methyl, or *p*-nitrophenyl trichlorophenyl ether than those given MTMC, methomyl or chlordimeform. A marked increase of punctate basophilic erythrocytes was observed only in animals given commercial formulations of chlorobenzilate or thiophanate methyl. All rabbits given butachlor died on the 5th day of the experiment. The blood of rabbits given technical chlorobenzilate and butachlor showed increase of Rets and punctate basophilic erythrocytes, simultaneously. The blood of rabbits given a combination of the above mentioned pesticides and fenitrothion also showed increases of Rets and punctate basophilic erythrocytes. Another experiment in which the dynamic erythrocytic membrane was examined in treated animals with the above mentioned administration using a cyclic path centrifuge showed changes.

78-0382. Fujita, K. ; Matsushima, S.; Abe, E.; Sasaki, K.; Kurosawa, K. (Japan Inst. Rural Med., Saku, Nagano, Japan) **[Examination of the effects of dichlorvos on the testis.]** *Nippon Noson Igakkai Zasshi (J. Jpn. Assoc. Rural Med.)* 26(3): 328-329; 1977. (Japanese)

Dichlorvos was forcibly administered p.o. to male Wistar rats (55 animals) at the age of 5 months at respective levels of 5 mg/kg and 10 mg/kg every other day for 8 weeks. A single p.o. administration of 50 mg/kg killed one out of ten animals. The rats were divided into 5 groups, and one group of rats was killed every 4 weeks to see the changes in several organs, especially examining about 200 individual seminiferous tubules. No change was seen in body weight gain and in the weight of the testes. The score values of the seminal cellular system decrease after 4-8 weeks of administration; however, the values were restored at 8 weeks after the end of administration.

78-0383. Matsushita, T. ; Aoyama, K.; Nomura, S.; Arimatsu, T. (Sch. Hyg. Fac. Med., Kagoshima Univ., Kagoshima, Japan) **[Studies on the diagnostic standards on allergic dermatitis due to pesticides.]** *Nippon Noson Igakkai Zasshi (J. Jpn. Assoc. of Rural Med.)* 26(3): 568-569; 1977. (Japanese)

Fundamental studies were carried out on the conditions for patch tests of pesticides, including: (1) kind of adhesive tape; (2) kind of diluents such as water, 70% alchohol, and white vaseline; (3) time of examination; and (4) simultaneous application of two pesticides, of which lime sulfur is used every time. When applied to man no difference of response was found for maneb and DDT; however, the response to formaldehyde was stronger for one a kind of adhesive tape (TORII). When applied to guinea pigs using thiophanate-methyl, the discrimination was best when "Festoplaster" was used. A 70% ethanol solution gave a stronger response in maneb-sensitized guinea pigs. After attachment for 48 hr, the response was strongest when 2 hr had elapsed. When two kinds of pesticides were applied simultaneously (one pesticide was fixed), the result differed according to the other pesticide in maneb-sensitized guinea pigs.

78-0384. Arimatsu, N. ; Kato, Y.; Nomura, S. (Sch. Publ. Health, Fac. Med., Kumamoto Univ., Kumamoto, Japan) **[On the primary stimulating action of pesticides on rabbit skin.]** *Nippon Noson Igakkai Zasshi (J. Jpn. Assoc. Rural Med.)* 26(3): 572-573; 1977. (Japanese)

Abdominal hair of New Zealand white male rabbits was shaved and a patch of one of the following pesticides was applied for 24 hr, using different patch tapes, diluents, and different concentrations of the pesticide. The evaluation was carried out at 30 min, 24 hr, and 48 hr after removing the patch, respectively. The pesticides were: (1) thionophosphates such as EPN, disulfoton, fenitrothion, cyanophos, fenthion, and salithion; (2) thiolophosphates such as *S*-benzyl diisopropyl phosphorothioates, Estox; (3) phosphates, such as dichlorvos, chlorpyrifos-methyl; (4) dithiophosphates, such as dimethoate, malathion, methidathion, thiometon, phenthoate; (5) *N*-methylcarbamtes, dithiocarbamates, polycarbamates, and thiophanate-methyl and benomyl. For the organophosphates, the smaller the LD50, the stronger was

the stimulating action; however, no such relationship was found for carbamates. The thiono-and thiolo-type organophosphorus pesticides seemed to be weak stimulatants however, the chemical structure of carbamates showed no relation to stimulation. In the case of organophosphorus pesticides the positivity of response seemed to be the strongest 48 hr after removing the patch.

78-0385. Kuczynski, M. A. (Dep. Histol. Embryol., Inst. Biostruct., Acad. Med. Bialystok, Poland) **Badania nad wplywem podostrego zatrucia foschloren na zachowanie sie glikogenu i fosforylaz w watrobie szczurow. [The influence of subacute poisoning with foschlor on levels of glycogen and phosphorylase in rat livers.]** *Patol. Pol.* 28: 113-123; 1977. (30 references) (Polish)

The effects of subacute levels of foschlor (trichlorfon) on rat liver cells was investigated. Rats were sacrificed 1 and 9 days after administration of 0.5, 0.2, and 0.1 LD50 foschlor (250, 100, and 50 mg/kg; respectively). Histochemical evaluation of liver slices revealed dose-dependent increases in glycogen concentration and decreases in phosphorylase activity. These results indicate that foschlor disrupts glycogenolysis in the liver cells.

78-0386. Zawirska, B. ; Dzik, D. (Dep. Pathol. Anat., Inst. Biostrukt, Wroclaw, Poland) **Doswiadczalna synporfirynogeneza watrobowa. [Experimental hepatic synporphyrinogenesis.]** *Patol. Pol.* 28(3): 349-354; 1977. (15 references) (Polish)

This study was performed to determine whether certain compounds of the group of porphyrinogogs (hexachlorobenzene and steroid hormones) applied together cause a more efficient synthesis of hepatic porphyrins than when applied separately. Inbred Wistar rats were divided into groups depending on the administered compound: I. hexachlorobenzene, II. hexachlorobenzene plus testosterone, III. hexachlorobenzene plus stilbestrol, IV hexachlorobenzene plus testosterone plus stilbestrol, and group V controls. Spectrophotometric and chromatographic investigations of porphyrins isolated from rat livers indicated that the most efficient effect of synporphyrinogenesis which was manifested through increased levels of uroporphyrin had occurred in the groups treated simultaneously with hexachlorobenzene and testosterone and with hexachlorobenzene, testosterone, and stilbestrol.

78-0387. Rizzuto, N. (Ist. Clin. Neurol., Univ. Padova, Sede di Verona, Italy) **Alcuni quadu di encefalopatie e neuropatie da agenti tossici. [Some encephalopathies and neuropathies caused by toxic agents.]** *Pathologica* 69: 137-153; 1977. (59 references) (Italian)

Some patterns of toxic damage to the nervous system are reviewed. Damage to the peripheral nervous system (PNS) by toxic substances is common. Axonal changes are the most frequent peripheral neuropathies observed, while segemental demyelination (ilead neuropathy) also occurs. Organophosphorus compounds produce a pattern of neuronal degeneration that is referred to as "dying-back type". Organomercuric compounds produce degeneration of sensory nerves which rapidly ascends to the dorsal roots. Isoniazid produces a characteristic pattern of degeneration which involves the spinal roots of the motor pathway; larger diameter fibers are generally not involved.

78-0388. Ito, R. (Dep. Pharmacol., Toko Univ., Tokyo, Japan) **Some pharmacological considerations on assessment of safety in perinatal stages.** *Paediatrician* 6(1): 5-8; 1977.

Organic mercury compounds, polychlorobiphenyls, organochlorines were examined as representative of hazardous substances which will attack infants in different ways than adults. Although PCBs are not used directly in connection with foodstuffs, like DDT, they are accumulated and concentrated in the environment. Attention was first drawn to PCBs after 1,000 cases of intoxication resulted from contamination of a cooking oil following an industrial mishap. PCBs are found in the highest concentrations in the sea, and are transferred gradually through the food chain. The safety dose for man is 5 μg/kg/day, calculated with a safety factor of 100; the lowest reported toxic dose was 14 times this amount. PCBs are accumulated primarily in the fat, skin, adrenals, thyroids, and liver. Toxic inorganic mercurials can be converted into more highly toxic methyl mercury by biological processes. Repeated biological concentration has produced the relatively high concentrations of mercury in ocean fish. The total body mercury content is correlated with the concentrations in hair, blood, and erythrocytes, and much of the methyl mercury accumulates in the erythrocytes. The minimum toxic level in Minamata disease was calculated as 5 μg/kg, indicating that man is more sensitive to mercury than monkeys. Uptake below the range of elimination (half life, 70-74 days) will not result in Minamata disease. Complete recovery of toxic metals from waste water is necessary.

78-0389. Wallnofer, P. R. ; Tillmanns, G.; Engelhardt, G. (Bayer. Landesanst. Bodenkult. und Pflanzenbau, Abt. Pflanzenschutz, Munich, Germany) **Degradation of acylanilide pesticides by *Aspergillus niger*.** *Pestic. Biochem. Physiol.* 7(5): 481-485; 1977. (17 references)

Transformation of the herbicide solan and the fungicide 2,5-dimethylfuran -3- carboxyanalide (FA) by *Aspergillus niger* was studied. *A. niger* was grown in a synthetic glucose medium under aerobic conditions at 30°C and pH 6.8-7.5. Solutions of solan and FA in acetone were added to the culture medium at final concentrations of 500 μmol/L and 100 μmol/L, respectively. Metabolites were analyzed using UV, fluorescent, and mass spectroscopic techniques. Within 14 and 10 days, respectively, a 1-liter culture of *A. niger* formed 195 μmol of metabolite from 500 μmol solan, leaving a residue of 150 μmol of the starting material, and 64 μmol of metabolite from 100 μmol of FA, leaving 10 μmol of FA. Small amounts of other metabolites were formed. The primary solan degradation product was identified as 3'-chloro-4'- methylacetanilide; FA was largely broken down to acetanilide.

78-0390. Sitkiewicz, D. ; Rakowska, I.; Skonieczna, M.; Chajdak, A. (Dept. Drug Metabolism, Inst, Biopharm., Med. Acad., 02-097 Warsaw, Banacha 1, Poland) **The effect of ronnel and its oxygen analog on succinate oxidation by rat brain, liver homogenates, and mitochondria.** *Pestic. Biochem. Physiol.* 7(6): 501-509; 1977. (22 references)

The effect of ronnel and its oxygen analog on the oxygen consumption of homogenates, and on the succinate dehydrogenase and cytochrome oxidase activities of the mitochondrial fractions of rat brain and liver were examined. Enzyme assays were performed using spectrophotometric and manometric techniques. In contrast to its thiophosphoorganic precursor, the oxygen analog caused a significant decrease in oxygen consumption by rat brain and liver homogenates, and a decrease in cytochrome oxidase activity in both solubilized mitochondrial fractions. Succinate dehydrogenase activity was reduced only slightly by the oxygen analog in the brain fraction, but was marked in the liver fractions. These studies indicate that the toxic activity of ronnel in vivo can be ascribed to its oxygen analog metabolite.

78-0391. Couch, R. C. ; Siegel, M. R.; Dorough, H. W. (Dept. Plant Pathol., Univ. Kentucky, Lexington, KY 40506) **Fate of captan and folpet in rats and their effects on isolated liver nuclei.** *Pestic. Biochem. Physiol.* 7(6): 547-558; 1977. (17 references)

In order to assess the effects of trichloromethylsulfenyl fungicides on genetic material, in vivo and in vitro radioisotope studies were performed on male Sprague-Dawley rats. Normal and 70% hepatectomized rats receiving a single ip dose of ^{35}S-captan, 6 mg/kg, eliminate 76% of the radioactivity in the urine and 13% in the feces within 13 hr; a single ip dose of ^{14}C-folpet, also 6 mg/kg, was almost totally eliminated in the urine within 24 hr. In other experiments isolated rat liver nuclei were fractionated and incubated for 1 hr with 12 μg/ml labeled captan. The nuclear sap protein, deoxynucleoprotein (including histone), acidic ribonucleoprotein, and residual protein fractions bound 10, 14, 39, and 16% of the total label, respectively. Captan treatment of fractionated nuclei (but not whole nuclei) resulted in anomalous polyacrylamide gel electrophoresis patterns. These studies indicate that trichloromethylsulfenyl fungicides could exert a direct toxic effect on genetic materials; however, in the intact animal, such an effect is probably limited by the rapid breakdown and excretion of these compounds.

78-0392. Reinert, F. C. ; Tinsley, I. J. (Environ. Health Sci. Cen., Oregon State Univ., Corvallis, OR 97331) **The incorporation of DDT and related compounds into lecithin bilayers.** *Pestic. Biochem. Physiol.* 7(6): 578-587; 1977. (25 references)

A proton nuclear magnetic resonance (NMR) technique was used to study the interaction of DDT-type compounds with lipid bilayers. Under the experimental conditions, the percentage of analogs which could be sedimented by low speed centrifugation at a lipid:chemical mol ratio of 9:1 was DDA, < 5%; MDDA, < 5%; DDE, 14%; DDT, > 95%. The most interesting result of this study was the finding that the lipophilicity of the analogs was not related to their hydrophobicity.

78-0393. Roberts, T. R. (Shell Res. Ltd., Shell Biosci. Lab., Sittingbourne Res. Cent., Sittingbourne, Kent ME9 8AG, England) **The metabolism of the herbicide flampropmethyl in wheat.** *Pestic. Sci.* 8(5): 463-472; 1977. (8 references)

The metabolism of the wild oat herbicide flampropmethyl, methyl (±)-2-[N-(3-chloro- 4-fluorophenyl) benzamido] propionate, in spring wheat grown to maturity has been studied under glasshouse and outdoor conditions. [^{14}C]-Flamprop-methyl labeled separately in the halophenyl ring and the carbonyl of the benzoyl group was used. The major metabolite formed in plants was the corresponding carboxylic acid II, which also occurred as conjugates. Other minor metabolites detected under glasshouse conditions only were the 3- and 4-hydroxybenzoyl analogues of flamprop-methyl and 3'-chloro-4- fluorobenzanilide. The soil in which the plants were grown contained residues comprising mainly flamprop-methyl and II together with smaller amounts of unidentified polar material. (Author abstract by permission)

78-0394. Torres, A. M. R. ; O'Flaherty, L. M. (Dep. Biol. Sci., Western Illinois Univ., Macomb, IL 61455) **Influence of pesticides on *Chlorella, Chlorococcum, Stigeoclonium* (Chlorophyceae), *Tribonema, Vaucheria* (Xanthophyceae) and *Oscillatoria* (Cyanophyceae).** *Phycologia* 15(1): 25-36; 1976. (75 references)

The influence of atrazine, simazine, malathion, and 2,4-D was studied on total chlorophyll production by the common soil algae *Chlorella vulgaris, Chlorococcum hypnosporum, Stigeoclonium tenue, Tribonema* sp., *Vaucheria geminata* and *Oscillatoria lutea.* In concentrations up to 100 mg/l, 2,4-D did not alter chlorophyll production by the algae. Pesticides did not influence *Chlorococcum.* Atrazine, simazine and malathion, added individually, inhibited chlorophyll production at concentrations of at least 1 mg/l, with the exception of *Stigeoclonium,* in which production was not inhibited by 1 mg/l simazine. The three pesticides stimulated chlorophyll production by *Chlorella* when present individually at 0.1 and 0.5 μg/l. The same was true for simazine and malathion on *Tribonema* and *Oscillatoria.* A significant interaction was found among atrazine, simazine and malathion. Treatment of *Vaucheria* with 1 μg/l malathion caused a production of brown crystals inside the cytoplasm, formation of a second cell wall inside the first, and distortion of gametangia developing at the time of initial treatment.

78-0395. Pekas, J. C. (Metab. Radiat. Res. Lab., ARS, USDA, Fargo, ND 58102) **Metabolism of a pesticidal carbamate: stomach-to-rectum profile in vitro.** *Physiologist* 20(4): 73; 1977.

The metabolism and transport of (naphthyl-C-14-labeled) *N*-methyl carbamate (carbaryl) by the stomach,

pylorus-to-bile duct segment, cecum, and colon-rectum of rats were investigated by a slightly modified everted sac technique. The following quantities of C-14 labeled metabolites were recovered in the media from the respective segments (μmol/g tissue dry matter-hr): 0.01 (stomach), 0.07 (pylorus-to-bile duct); 0.02 (cecum); and 0.16 (colon-rectum). These values are 5, 40, 10, and 9%, resp., of the value obtained from the cranial third of the small intestine. The concentrations of unmetabolized carbamate in mucosal and serosal fluids remained near equilibrium in each case. The concentrations of polar metabolites in serosal fluids attained values 2 to 80 times the concentration in mucosal fluids. The polar metabolites were not identified. However, it was noted that the principal polar metabolites of the cecum did not behave as naphthyl glucuronide, which is the principal metabolite of the small intestine. The entire length of the gastrointestinal tract has metabolic and transport activities that affect this carbamate or its metabolites. These activities vary widely and independently.

78-0396. Byczkowski, J. Z. (Dept. Pharmacol., Inst. Pathol., Med. Acad., PL-80 227) **Biochemical and ultrastructural changes in biological membranes induced by *p,p'*-DDT (chlorophenotanum) and its metabolites.** *Pol. J. Pharmacol. Pharm.* 29(4): 411-417; 1977. (23 references)

The effects of DDT and its main metabolites on rat liver mitochondria and chick embryo heart cells were investigated. In vitro systems of mitochondria and heart cells were prepared and treated with 0.2 mM and 1 mM solutions, respectively, of DDT, DDE, or DDA in ethanol. Mitochondria treated with these chemicals showed no clear morphological differences, but were more irregular in shape and size, swollen, and their matrix had a lower electron density. Outer membranes were often ruptured and small, and empty vesicles were formed between inner and outer lamina. In heart cells treated with DDT or DDE, protamine inhibited O_2 consumption; control heart cells were unaffected by the protamine. These results indicate that DDT and its metabolites can damage biological membranes.

78-0397. Fulde, S. (Warsaw, Poland) **New Polish insecticides for agriculture.** *Pol. Tech. Rev.* 94(6): 11-12; 1977.

The organic phosphorus compounds constitute one of the most active groups of insecticides. Special mention is made of the enol phosphates, which are highly effective in action and which decay very quickly in plants and in the soil. Chlorfenvinfos, a widely known enol phosphate, is an excellent Colorado potato beetle insecticide. However, chlorfenvinfos has high toxicity to certain species of warm-blooded animals. Synthesis of other compounds and tests conducted with them are described. Specific mention is made of bromfenvinfos and mebrovinfos, with results of toxicity tests and the main properties of each of the two compounds.

78-0398. Krampl, V. ; Hladka, A. (Inst. Hyg. Epidemiol., Prague, Czechoslovakia) **Vyznam hepetalnej enzymovej indukcie pri hodnoteni ucinku nizkych davok chlororganickych insekticidov. [The importance of hepatic enzyme induction in the evaluation of the effect of low doses of chlorinated insecticides.]** *Pracov. Lek.* 29(4-5): 129-133; 1977. (9 references) (Czech)

The effect of orally administered low doses of chlorinated insecticides was studied on microsomal enzyme stimulation in the livers of white male rats. Aldrin and dieldrin were given at doses of 0.25, 1.25, and 2.50 mg/kg/day in long term experiments. Exposures to aldrin, dieldrin, lindane, and heptachlor at doses of 0.05, 0.25, 1.25, and 2.50 mg/kg/day were carried out in short term experiments. The activity of microsomal enzymes which catalyze the *O*-demethylation of *p*-nitroanisole and the oxidative detoxication of EPN was directly determined quantitatively in liver homogenates. Enzyme induction reached a maximum in the first two weeks of long term exposure with no dependence on the dose used. The ineffective doses for enzyme induction ascertained in the short term experiment were smaller than the ineffective doses of these substances ascertained on the basis of histopathologic changes in the liver in chronic experiments by other authors. The results of these studies suggest that enzyme induction contributes to a more sensitive determination of ineffective doses of chlorinated insecticides than does the histopathologic method.

78-0399. Hladka, A. (Natl. Inst. Hyg. Bratislava, Czechoslovakia) **Hodnotenie vplyvu sprievodnych necistot na toxicky ucinok fenitrotionu. [Evaluation of the influence of accompanying impurities on the toxic effect of fenitrothion.]** *Pracov. Lek.* 29(4-5): 173-176; 1977. (11 references) (Czech)

The influence of accompanying impurities on the toxic effects of fenitrothion were evaluated. The substance studied was Metathion, the effective component of which is technical fenitrothion containing the fenitrothion *S*-methyl isomer. Results from the studies on anticholinesterase activity of *S*-methylfenitrothion and the rapidity of its degradation after a single administration to white rats suggests that the period of cholinesterase reactivation is significantly prolonged. The results of the current experiments suggest that the *S*-methyl isomer of fenitrothion is metabolized more rapidly in organisms than is fenitrothion itself. This fact corresponds to the chemical properties resulting from the differing structure of this isomer.

78-0400. Lameijer, W. ; van Zwieten, P. A. (Dep. of Pharmacy, Division of Pharmacotherapy, University of Amsterdam, The Netherlands) **Kinetics of thallium elimination in the rat after acute and subacute intoxication: influence of diuretic treatment.** *Proc. Eur. Soc. Toxicol.* 18: 163-164; 1977. (3 references)

Acute toxic effects of thallium(I) sulfate on the cardiovascular system of male Wistar rats have been demonstrated in previous studies. Distribution patterns and consequences of thallium loading in rats were determined after prolonged administration of 10 and 30 ppm thallium(I) sulfate in drinking water. Wistar rats, given thallium at 10 ppm, did not

show any visible symptoms except for loss of hair. Tissue samples, taken at 9 and 24 weeks, showed thallium concentrations to be highest in the medulla of the kidneys (35 ppm). Animals subjected to 30 ppm reached a plateau level 2 to 4 times faster than the 10 ppm group, but showed the same distribution patterns of thallium. Treatment of thallotoxicosis, consisting of the administration of diuretics furosemide at 6 mg/kg and ethacrynic acid at 2.5 and 25 mg/kg increased the renal excretion of thallium from the body.

78-0401. Marking, L. L. (U. S. Fish and Wildlife Service, Fish Control Lab., La Crosse, WI.) **Toxicity of the synthetic pyrethroid SBP-1382 to fish.** *Prog. Fish-Cult.* 36(3): 144; 1974.

The toxicity of the synthetic pyrethroid SBP-1382 to fish is briefly discussed. This pyrethroid is uniformly toxic to coldwater and warmwater fish of fingerling size in standard, static, laboratory tests. The 96-hour LC50s ranged from 1 to 5 μg/l for coho salmon, chinook salmon, rainbow trout, lake trout, brook trout, carp, white sucker, green sunfish, bluegill, and yellow perch. The 96-hour LC50 for channel catfish was 15 μg/l. The pyrethrin was significantly more toxic at low than at high water temperatures. The compound was equally toxic to rainbow trout, green sunfish, and bluegill in waters of different hardness and of different acidity. Although the chemical shows potential as a fish toxicant, registration would require extensive study of its effects on nontarget organisms and on various life stages of fish.

78-0402. Coulston, F. ; Wills, J. H. (Inst. Comp. Hum. Toxicol., Albany Med. Coll., Union Univ., Albany, NY 12208) **Mutagenic, carcinogenic and teratogenic effects of pollutants in respect to man.** *Pure Appl. Chem.* 42(1-2): 209-222; 1975. (66 references)

The mutagenic, carcinogenic and teratogenic effects of pollutants in respect to man are reviewed. While there have been several chemicals that occur, or have occurred, in industry which have been demonstrated to have carcinogenic activity in man, teratogenic and especially mutagenic activities on man within industrial compounds are rarer or nonexistent. Laboratory demonstrations of teratogenic and mutagenic activities by industrial chemicals properly raise the question of whether such effects would appear in human populations exposed to the same chemicals. The widely differing responses of different species and even of strains in a given species to carcinogenic, teratogenic, and mutagenic chemicals makes it difficult to extrapolate the results of tests made on experimental animals to those exposures to which humans are subject. The fact that all three types of activity considered herein probably involve effects on nucleic acids, and the fact that repair of defects in nucleic acids can occur, quite possibly to different extents and at different rates in various species, add to the uncertainty of extrapolations to man for these three sorts of actions by environmental chemicals.

78-0403. Kaminski, A. (Med. Acad. Med. Biol. Dept. 90-647 Lodz, Poland) **The use of biological tests for the examination of pesticides.** *Pure Appl. Chem.* 41(1-2): 255-284; 1975. (20 references)

The use of biological tests for the examination of pesticides is considered. The main objective of the tests is to estimate: practical value of pesticides, mechanism of action, damage to human health, and methods of detection and quantitative evaluation. A detailed analysis of pesticide efficiency and also of ecological response of the environment to a pesticide should cover: spectrum of species sensibility; results of qualitative and quantitative bioassay analyses; community response to the pesticide contamination; neutralization, toleration, and adaptation abilities of ecosystems; share of a given pesticide in total toxicity caused by the chemical contamination; and ecological predictions of environmental contamination with pesticides. Numbers or graphs can be used to express all these features of a pesticide. The present paper also described a project, based on experimentation, on the application of a multi-assay bioindicator analysis for the ecological evaluation of pesticides already used or being introduced for use. The experimental animals were: *Asellus, Lumbriculus, Cloeon, Daphnia, Planorbarius,* and *Lebistes.* They were used as bioindicators for organophosphate insecticides applied at 0.01-0.001 ppm.

78-0404. Kenaga, E. E. (Dow Chem. USA, PO Box 1706, Midland, MI 48640) **Use of biological tests for evaluation of pesticides.** *Pure Appl. Chem.* 41(1-2): 285-299; 1975. (31 references)

The use of biological tests for evaluation of pesticides is reviewed. The role which biological tests have played in the evaluation of pesticides is divided in this paper into the following three major categories: effects on target and nontarget organisms; distribution and fate of pesticides in the environment; and interpretation of data. Such studies are necessary for studying the toxicity and biochemical effects of pesticides to individual species in the animal and plant kingdoms as well as for indirect determination of biologically important physical and chemical properties of pesticides. Some of the more important requisites for meaningful application of biological tests are careful method standardization; use of sensitive sub-lethal indicators of toxicity; detailed knowledge of the life cycle and the environmental requirements of organisms; and proper interpretation and limitation of use of the data engendered.

78-0405. Elovaara, E. ; Savolainen, H.; Vainio, H.; Parkki, N. G.; Aitio, A. (Dept. Ind. Hyg. Toxicol., Inst. Occupational Health, Helsinki, Finland) **Neurochemical effects of 2,3,7,-8-tetrachlorodibenzo-*p*-dioxin in Wistar and Gunn rats.** *Res. Commun. Chem. Pathol. Pharmacol.* 18(3): 487-494; 1977. (21 references)

This study was designed to clarify the mechanism of TCDD intoxication in rat brain. The effects of TCDD treatment on the brain soluble DT-diaphorase were studied as well as those on acid proteinase activities in both normal Wistar

and hyperbilirubinemic Gunn rats. The rats were killed one week after a single intragastric dose of TCDD at 20 μg/kg in acetone-olive oil. Brain protein and RNA content were measured together with enzyme assays of lysosomal acid proteinase and soluble DT-diaphorase. Acid proteinase activity was increased in brains of normal Wistar rats after treatment. RNA and protein contents were lowered in the heterozygous Gunn rats, whereas no changes were detected in the homozygous Gunn rats. The cerebral soluble DT-diaphorase activity was slightly enhanced (about 35%) by TCDD treatment only in normal Wistar rats. These results may point toward modified neurotoxic effects of TCDD in chronic exposure to bilirubin as in the case of Gunn rats.

78-0406. Hollinger, M. A. ; Giri, S. N.; Freywald, M. (Dep. Pharmacol., Sch. Med., Physiol. Sci., Sch. Vet. Med., Univ. Calif., Davis, CA 95616) **Effect of parenteral zinc on paraquat toxicity in the rat.** *Res. Commun. Chem. Pathol. Pharmacol.* 18(4): 689-696; 1977. (8 references)

This study was undertaken to assess whether zinc may have a pharmacological effect in protecting the lung against paraquat damage. Several doses of zinc sulfate (20, 40 and 80 mg/kg) were given i.p. for 7 days, and the amount of zinc in the lung was then measured. Only 80 mg/kg produced a significant increase in lung zinc. Acute administration of 80 mg/kg zinc sulfate produced an 81% elevation in lung zinc within 4 hours. Animals were treated with 80 mg/kg zinc sulfate, followed 4 hours later by paraquat (42.5 mg/kg). The animals also received 2 additional doses of zinc during the next 48 hours. Zinc treated animals were not protected against the lethal effect of paraquat but, instead, had a higher fatality rate than animals treated with paraquat alone.

78-0407. Zawadzka, T. (Natl. Inst. Hyg., Warsaw, Poland) **Wplyw niedoborow bialka i kaptanu na aktywnosc fosfatazy alkalicznej i UDP-glukuronylotransferazy watroby szczurow. [The effect of selected pesticides on the activity of carbonic dehydratase in vitro. III. The effect of cynkotox and luxan maneb 80 on the activity of rat and human carbonic dehydratase.]** *Rocz. Panstw. Zakl. Hig.* 28(4): 351-354; 1977. (7 references) (Polish)

The effects of zinc ethylenebisdithiocarbamate (zineb, cynkotox) and luxan maneb 80 (manganese ethylenebisdithiocarbamate) on carbonic dehydratase activity in rat and human blood was studied. The results of this study indicate that maneb is a stronger inhibitor of carbonic dehydratase activity than is cynkotox. Inhibition of dehydratase activity in human blood by cynkotox was greater than inhibition of the rat blood dehydratase.

78-0408. Sikorski, S. ; Oledzka, R. (Dep. Bromatol., Inst. Biofarm. Akad. Med., Warsaw, Poland) **Wplyw dichlorfosu na synteze jelitowego bialka wiazacego Wapn-CaBP [The effect of dichlorvos on intestinal synthesis of calcium-binding protein--CaBP.]** *Rocz. Panstw. Zakl. Hig.* 28(4): 373-378; 1977. (14 references) (Polish)

The effect of dichlorvos on intestinal synthesis of calcium binding protein (CaBP) in chick embryo culture was studied. In one group of embryos, vitamin D_3, the CaBP inducing factor, was added concurrently with dichlorvos at the start of culture. In another group of embryos, vitamin D_3 was added to the intestinal culture 2 to 12 hr after preincubation with dichlorvos. There were no significant differences in the rate of CaBP synthesis between these two groups. These studies suggest that neither dichlorvos nor any of its metabolites has any effect on the synthesis of CaBP.

78-0409. Syrowatka, T. ; Jurek, A. (Dep. Toksykol. Sanit., Natl. Inst. Hyg., Warsaw, Poland) **Badania wplywu propoksuru na aktywnosc aryloamidazy watrobowej szczura. [Investigation on the effect of propoxur on rat liver arylamidase activity.** *Rocz. Panstw. Zakl. Hig.* 28(4): 379-384; 1977. (2 references) (Polish)

The effect of propoxur, a carbamate insecticide, on the activity of arylamidase (acetanilidase) was investigated. Male Wistar rats, aged 6 wk and weighing between 80 and 100 g, received multiple doses of propoxur, at 13, 26, or 65 mg/kg, p.o. Liver arylamidase activity was measured according to the colorimetric method of Satoh and Moroi, using acetanilide as a substrate. Propoxur at 10_0^3 M inhibited arylamidase activity by 40% in vitro. In vivo, arylamidase was inhibited 90% after an oral dose of propoxur, 65 mg/kg. These experiments demonstrate the high sensitivity of arylamidase to propoxur.

78-0410. Jurek, A. ; Syrowatka, T. (Dep. Sanit. Toksykol., Natl. Inst. Hyg., Warsaw, Poland) **Wplyw insektycydow karbaminianowych na poziom 5-hydroksytryptaminy i kwasu 5-hydroksyindolooctowego w tkankach szczurow szczepu Wistar. [Effect of carbamate insecticides on tissue levels of 5-hydroxytryptamine and 5-hydroxyindoleacetic acid in Wistar rats.]** *Rocz. Panstw. Zak. Hig.* 28(4): 385-390; 1977. (18 references) (Polish)

Male Wistar rats, aged 6-8 wk and weighing 150-180 g were dosed intragastrically with 0.5 LD50 doses of propoxur (65 mg/kg) or carbaryl (300 mg/kg). At 2, 6, and 24 hr after administration, the animals were sacrificed, and brain, spleen and lung levels of 5-hydroxytryptamine (5HT) were determined fluorometrically. The level of 5-hydroxyindoleacetic acid (HIA), a metabolite of 5HT, was also determined in the brain. Propoxur decreased the level of 5HT in the lungs and spleen by 70 and 30%, respectively, and decreased the level of HIA in the brain by 50%. The effects of carbaryl were similar.

78-0411. Jackson, J. A. ; Chart, I. S.; Sanderson, J. H. (Hematology Sec., Central Toxicol. Lab., ICI Ltd., Alderley Park, Cheshire, England) **Primicarb induced immune haemolytic anaemia in dogs.** *Scand. J. Hematol.* 19(4): 360-366; 1977. (15 references)

The effects of primicarb administration in dogs were investigated. Four age, weight and stature matched beagles

(2 male, 2 female) were dosed with either 25 or 50 mg/kg/day pirimicarb for 110 wk. Two dogs were unaffected. Two other dogs, which had been prescreened as anemics, developed adverse reactions after 10 wk of administration. In these dogs, Hb was approximately 50% of normal, the reticulocyte percentage was elevated 11-21 fold, unconjugated bilirubin was 3-5 times normal, haptoglobin was less than 1 mg/100 ml, methemoglobin was present, and IgG was elevated 4-fold. This study demonstrates that hemolytic anemia can be induced by nonpharmaceutical products; however, it is unlikely for this to occur in humans exposed to pirimicarb at concentrations likely to be encountered.

78-0412. Villeneuve, D. C. ; Van Logten, M. J.; Vos, J. G.; Den Tonkelaar, E. M.; Greve, P. A.; Speijers, G. J. A.; Van Esch, G. J. (Lab. Toxicol. Patol., Natl. Inst. Public Health, Bilthoven, The Netherlands) **Effect of food deprivation on low level hexachlorobenzene exposure in rats.** *Sci. Total Environ.* 8: 179-186; 1977. (12 references)

Experiments were performed to determine whether food deprivation could modify the biological activity of HCB in rats. One group of rats were fed the standard control diet ad libitum for 2 wk, to which was added 0, 20, or 100 ppm HCB during weeks 3 through 6. Another group of rats were fed approximately 50% of the standard control diet of the other group, for 2 wk to which was added 0, 40, or 200 ppm HCB during weeks 3 through six. Food intake, body weight changes, tissue weight changes, and microsomal enzyme activity and histopathology of the liver, kidneys, adrenals, and pancreas were the parameters measured. Food deprivation resulted in higher plasma, liver, brain, and adrenal accumulation of HCB in rats. Food deprivation enhanced induction of microsomal activity at both levels. Liver hypertrophy was observed in the food deprived rats at the higher dose level. It appears unlikely that these effects could be solely related to the increased tissue levels of HCB. Further study is called for to determine the effects of a longer period of food deprivation on the toxicity, distribution, and excretion of HCB.

78-0413. Cornfield, J. (George Washington Univ., Washington, DC 20052) **Carcinogenic risk assessment.** *Science* 198(4318): 693-699; 1977. (33 references)

Carcinogenic risk assessment involves a mixture of statistical, scientific, and public policy considerations. Concepts in current use, such as 'no observed effect levels' and 'virtual safety', and the problems in implementing them by means of dose-response models, particularly the probit-log dose and linear models are reviewed. The upper limits to risk provided by some conservative procedures are inconsistent with coherent balancing of risks and benefits. A common basis to the dose-response curves describing both carcinogenic and noncarcinogenic effects is to be found in deactivating reactions. A simplified model in which a toxic substance is activated and deactivated in separate and simultaneous reactions is presented and the dose response curve implied by the model is deduced. This curve has the general form of a hockey stick, with the striking part flat or nearly flat until the dose administered saturates the deactivation system, after which the probability of a response rises rapidly. Such a curve describes the Bryan-Shimkin methylcholanthrene-tumor incidence dose response curve as well as the probit log-dose model. The concept of a saturation dose is relevant to risk assessments for carcinogenic and noncarcinogenic substances alike. (Author abstract by permission. Copyright 1977 by the American Association for the Advancement of Science)

78-0414. Fukunaga, K. ; Fukami, M.; Murakami, M.; Usui, M. (Lab. Insect Pharmacol., Inst. Phys. Chem. Res., Wako, Saitama Prefecture, Japan) **[Basic studies for preventing environmental pollution due to repeated use of insecticides. Part 1. Incorporation of pesticides and environmental chemicals into cultured human cells.]** *Showa 51 Neno Kenkyu Nempo, Rikagaku Kenkyusho (Annu. Rep. Inst. Phys. Chem. Res.)* :82; 1976. (1 reference) (Japanese)

As a link in the composite approach to evaluating the safety of pesticides the incorporation of pesticides and environmental chemicals into cultured human cells and their persistence in the cells were studied. It was found that those compounds such as DDT, dieldrin, aldrin, PCBs, and hexachlorobenzene, which have been considered to be persistent in lipids of living organisms were incorporated into the cells in larger amounts than those compounds such as malathion, parathion, chlordimeform, 2,4,D and 2,4,5-T. However, it was also found that carbaryl, which has hitherto been considered to be less persistent in soil, was incorporated into the cells in fairly large amounts. The fact is presumably due to the lack of a phthalene ring in the molecule of carbaryl. More 2,4,5-T was introduced into the cells, presumably due to the larger solubility in fats of the latter owing to the larger number of chlorine atoms in the latter. As the culture progressed, the introduced chemicals were slowly excreted from the cells.

78-0415. Soderlund, D. M. ; Casida, J. E. (Pestic. Chem. Toxicol. Lab., Dep. Entomol. Sci., Univ. California, Berkeley, CA 94720) **Stereospecificity of pyrethroid metabolism in mammals.** *Synthetic Pyrethroids ACS Symp. Ser. 42* pp. 173-185; 1977. (10 references)

The metabolic stereoselectivity of various isomers of resmethrin, permethrin, S-5439, and S-5602 was studied in vivo in rats and in vitro using mouse and rat liver microsomes. The rates of metabolism of the following pyrethroid optical antipodes by mouse liver microsomes differed by at least 1.7-fold: hydrolysis of (1R,*trans*)-vs (1S,*trans*)-resmethrin; hydrolysis of S(+)- vs R(-)-S-5439 and -S-5602; methyl hydroxylation of (1R,*trans*)- vs (1S,*trans*)-permethrin; methyl hydroxylation of S(+)- vs R(-)-S-5439; oxidation of S(+)- vs R(-)-S-5602; and hydrolysis and oxidation of αR- vs αS-R(-)-S-5602. Various degrees of stereospecificity were encountered with mouse and rat liver microsomal oxidases in the preferred methyl group for hydroxylation, i.e., *trans*(E) vs *cis*(Z) in the isobutenyl moiety of the four resmethrin isomers and 2-*trans* vs 2-*cis* in the four permethrin isomers. Stereospecificity in the methyl hydroxylation of (1R)- and (1RS)-preparations of *trans*- and *cis*-permethrin was also evident in vivo in rats.

78-0416. Ruddick, J. A. ; Newsome, W. H.; Iverson, F. (Food Directorate, Health Protection Branch, Tunney's Pasture, Ottawa, Ontario K1A OL2, Canada) **A comparison of the distribution, metabolism and excretion of ethylenethiourea in the pregnant mouse and rat.** *Teratology* 16(2): 159-162; 1977. (13 references)

Pregnant mice and rats were treated by stomach intubation on day 15 of gestation with 240 mg/kg of ethylenethiourea (ETU) made up in part with radiolabeled ETU. Animals were sacrificed at specific times post-treatment, and maternal tissues, fetus, urine and feces were collected for determination of radioactivity. Maternal and fetal tissue levels of ETU were similar at three hours post treatment; thereafter, the mouse (maternal and fetus) showed much less ETU than the rat. The t1/2 of ETU elimination from the maternal blood was 9.4 and 5.5 hours for the rat and mouse, respectively. Analysis of urine by thin-layer chromatography and radiochromatography revealed that the mouse and rat metabolized ETU by different pathways. Furthermore, the mouse is able to metabolize ETU to a greater extent than the rat. (Author abstract by permission)

78-0417. Kobayashi, S. ; Chang, H. S.; Toida, S.; Kawaguchi, K.; Kobayashi, T. (Dept. Pharmacol., Faculty of Med., Tobo Univ., Omori, Tokyo, Japan) **[Multigeneration reproduction study of phosdiphen, a new organophosphoric fungicide, on mice.]** *Toho Igakukai Zasshi (J. Med. Soc. Toho Univ.)* 24(4): 620-637; 1977. (7 references) (Japanese)

Mice of the ICR strain were fed a diet containing 10 and 500 ppm of phosdiphen, a new organophosphorus fungicide (corresponding to 2 and 100 mg/kg b.w./day, respectively) for four generations to study the fungicide's effect on cholinesterase, their reproductive capability, and their correlation in the mouse. The results showed that except for the increase in liver weight in the higher group dose, the fungicide did not affect the growth and the reproductive capability including lactation. Although serum cholinesterase was inhibited as much as 80% by the larger dose, erythrocyte cholinesterase was scarcely inhibited; the inhibition did not accumulate by generation, but rather was adaptive. In short, it was concluded that phosdiphen did not affect the reproductive capability and did not cause teratogenesis despite its rather strong inhibition of serum cholinesterase activity of the mouse. The procedures and the design of reproduction experiments were considered taking into consideration the similarity of cholinesterase activity in the mouse to that of man.

78-0418. Crabtree, H. C. ; Lock, E. A.; Rose, M. S. (Biochemical Mechanisms Section, Imperial Chemical Industries Ltd., Central Toxicology Laboratory, Alderley Park, Macclesfield, Cheshire SK104TJ, UK) **Effects of diquat on the gastrointestinal tract of rats.** *Toxicol. Appl. Pharmacol.* 41(3): 585-595; 1977. (18 references)

After oral administration of 900 μmol of diquat/kg (LD50) to male rats there was a rapid accumulation of water in the lumen of the gastrointestinal tract of all animals. This reached a maximum 24 hr after dosing (excess water at 24 hr, approximately 14 ml/rat). Other tissues, especially blood, were dehydrated. Twenty-four hours after dosing the degree of hemoconcentration and the amount of excess water in the gastrointestinal tract were related to the amount of diquat administered. Subcutaneous injection of 90 μmol of diquat/kg caused a delayed increase in water content and dry weight of the gastrointestinal tract. Severe changes were limited to a group of fatally poisoned animals which died between 2 and 8 weeks following injection. These animals had significantly increased tissue water. Following oral administration of an LD50 of diquat to rats, deaths occurred over 9 days with about 50% of these occurring within the first 3 days. Animals which did not gain weight 24 hr after an oral LD50 had significantly greater gastrointestinal water content and had a significantly more pronounced hemoconcentration than the animals in the remaining group which gained weight. It is concluded that diquat has an effect on water distribution within the body following oral administration and that early deaths are associated with rapid fluid loss into the gastrointestinal tract. Death following subcutaneous dosing appears to be an unrelated phenomenon. (Author abstract by permission)

78-0419. Joy, R. M. (Dep. Physiol. Sci., Univ. California, School Vet. Med., Davis, CA 95616) **Contrasting actions of dieldrin and aldrin-transdiol, its metabolite, on cat CNS function.** *Toxicol. Appl. Pharmacol.* 42(1): 137-148; 1977. (20 references)

Dieldrin and aldrin-transdiol were administered to cats to test whether dieldrin is directly active or whether it requires conversion to aldrin-transdiol for CNS effects. In cats 2-4 mg/kg dieldrin produced convulsive activity in 2-15 min. This was preceded by changes in the EEG and in responses evoked by sensory stimuli consistent with changes produced by pentylenetetrazol-type convulsants. Aldrin-transdiol in doses up to 20 mg/kg was without effect in cats. No convulsions were observed. No evidence of CNS action could be discerned from examination of the EEG or from responses to sensory stimulation. The results are consistent with the idea that dieldrin is directly active in the mammalian CNS. Its metabolite, aldrin-transdiol, when injected directly into the blood stream is either inactive or is incapable of entering the CNS from this route. The former alternative appears most likely. (Author abstract by permission)

78-0420. Lowy, R. ; Albrecht, R.; Pelissier, M. A.; Manchon, P. (Lab. Nutr. Hum. EPHE, Hosp. Bichat, F-75018 Paris, France; Lab. Biol., CNAM, F-75141 Paris Cedex 03, France) **Determination of the "no-effect levels" of two pesticides, lindane and zineb, on the microsomal enzyme activities of rat liver.** *Toxicol. Appl. Pharmacol.* 42(2): 329-338; 1977. (22 references)

For 4 weeks young male Wistar rats were fed diets containing various doses of lindane, an inducer of liver microsomal mixed function oxidase, or of zineb, an inhibitor of

this system. The dosages were: 0 (control), 0.2, 0.5, 2, 20, and 120 ppm for lindane; and 0 (control), 6, 15, 60, 600, and 3600 ppm for zineb. The parameters assayed were liver microsomal aminopyrine -*N*- demethylase and aniline hydroxylase activities, and cytochorme P-450 concentration. Lindane had the same increasing effect on the three paramaters assayed. The dose inducing the least significant difference at the $p < 0.05$ level was 4 ± 0.3 ppm, when results were relative to whole liver weight. Zineb did not have the same inhibiting effect, aniline hydroxylase being the most sensitive of the three parameters, with a computed dose of 74 ± 15 ppm, irrespective of the reference base. The no-effect levels at the $p < 0.95$ confidence interval were 20 or 40 times lower than the preceding ones, being 0.16 ± 0.02 ppm for lindane and, in the case of aniline hydroxylase activity and zineb, 2 ± 0.3 ppm. From a probability point of view, the classical "no-effect level" is a dose below which it can be said that the effect is truly zero, but with a confidence level only higher than 5%. The method presented here allows a reasonable downward extrapolation for a better confidence level of 95%. (Author abstract by permission)

78-0421. Verberk, M. M. (Coronel Lab., Fac. Med., Univ Amsterdam, Amsterdam, The Netherlands) **Incipient cholinesterase inhibition in volunteers ingesting monocrotophos or mevinphos for one month.** *Toxicol. Appl. Pharmacol.* 42(2): 345-350; 1977. (8 references)

Monocrotophos or mevinphos were administered daily for 1 month to groups of six and eight male subjects. Monocrotophos, 3.6 μg/kg, lowered plasma ChE by 15%, and 5.7 μg/kg lowered it by 24%. Compared with other organophosphorus pesticides studied in a similar experimental degisn, it appeared to be the most effective plasma ChE-inhibiting pesticide. It had no effect on red blood cell ChE. Mevinphos, 25 μg/kg, lower plasma ChE by 13% and red blood cell ChE by 19%. (Author abstract by permission)

78-0422. Verberk, M. M. ; Salle, H. J. A. (Coronel Lab., Fac. Med., Univ. Amsterdam, Amsterdam, The Netherlands) **Effects on nervous function in volunteers ingesting mevinphos for one month.** *Toxicol. Appl. Pharmacol.* 42(2): 351-358; 1977. (20 references)

To investigate reported nervous system effects of chronic exposure to organophosphorus pesticides, mevinphos 25 μg/kg, was administered daily to eight male subjects for 28 days; results were compared to those in a control group. At the end of exposure, a 7% decrease in slow fiber motor nerve conduction velocity and a 38% increase in Achilles tendon reflex force were found. No effect on neuromuscular transmission was observed. Red blood cell cholinesterase depression was 19%. Results confirm similar deviations found in pesticide workers. (Author abstract by permission)

78-0423. Schwetz, B. A. ; Smith, F. A.; Humiston, C. G.; Quast, J. F.; Kociba, R. J. (Toxicol. Res. Lab., Health Environ. Res. Dow Chem. U.S.A. Midland MI 48640) **Results of a reproduction study in rats fed diets containing hexachlorobutadiene.** *Toxicol. Appl. Pharmacol.* 42(2): 387-398; 1977. (6 references)

Hexachlorobutadiene (HCBD) is a by-product of certain processes associated with the chlorination of hydrocarbons. Very small amounts of HCBD may also be produced in chlorine cells. This study evaluated the effects of HCBD on reproduction in rats. Groups of male and female adult rats were fed diets containing HCBD at dose levels of 0, 0.2, or 20 mg/kg/day for 90 days prior to mating, 15 days during mating, and subsequently throughout gestation and lactation. Signs of toxicity among the adult rats were observed at the two higher dose levels and included decreased weight gain and food consumption as well as alterations in kidney structure. There was no effect on pregnancy or neonatal survival and development. The body weight of neonates at the time of weaning, 21 days of age, was slightly but significantly less than that of control litters. This effect was found only at the high dose level. No toxic effects were observed among the adults at a dose level of 0.2 or 2.0 mg/kg/day.

78-0424. Hill, E. F. ; Spann, J. W.; Williams, J. D. (U. S. Fish Wildl. Serv., Patuxent Wildl. Res. Cent., Laurel, MD 20811) **Responsiveness of 6 to 14 generations of birds to dietary dieldrin toxicity.** *Toxicol. Appl. Pharmacol.* 42(2): 425-431; 1977. (11 references)

The lethal dietary toxicity of dieldrin was estimated repeatedly during 8 years of testing young bobwhites (*Colinus virginianus*), Japanese quail (*Coturnix c. japonica*), ring-necked pheasants (*Phasianus colchicus*), and mallards (*Anas platyrhynchos*). Toxicities, quantified as 8-day LC50 values (5 days on toxic diet, followed by 3 days of untreated feed), were estimated at least 18 times per species. Average dietary LC50 values (ppm) and their 95% confidence limits for 14-day-old quail and 10-day-old pheasants and mallards were: bobwhite, 38 (34-42); Japanese quail, 61 (58-64); ring-necked pheasant, 56 (53-59); and mallard, 179 (163-195). No time-related changes were detected in LC50 values for any of the species. (Author abstract by permission)

78-0425. Reed, D. L. ; Bush, P. B.; Booth, N. H.; Kiker, J. T.; Goetsch, D. D.; Farrell, R. L. (Physiol. Pharmacol. Dep., Ext. Poul. Sci. Dep., Pathol. Dep., Univ. GA, Athens, GA 30602) **Tissue residues from feeding pentachloronitrobenzene to broiler chickens.** *Toxicol. Appl. Pharamcol.* 42(2): 433-441; 1977. (17 references)

Male broiler chicks (Hubbard-Hubbard) were fed graded levels (0, 0.1, 1.0, 5.0, and 20 ppm) of formulated pentachloronitrobenzene (PCNB) for 8 weeks. Each treatment consisted of 50 randomly selected birds (approximately 25 birds for each of two replicates). No treatment-related changes in body weight or organ weight were observed. Histopathologic examination of brain, liver, testes, pancreas, small intestine, ventriculus, spleen, kidney, lung, and heart failed to reveal lesions in either control or treated groups. Traces of PCNB residue and its major metabolite, pentachloroaniline (PCA), were occasionally found in body organs

(> 0.01 ppm) but were absent from adipose tissue. Hexachlorobenzene (HCB), a trace contaminant of PCNB, accumulated in adipose tissue to a level of 25 to 50 times over the concentration in the feed. After 7 weeks, rations containing PCNB were withdrawn and nonmedicated feed was provided. After 5 weeks of withdrawal, > 0.5 ppm of HCB remained in adipose tissue of birds that had been fed 20 ppm of PCNB. (Author abstract by permission)

78-0426. Smith, L. L. ; Rose, M. S. (Biochem. Mechanisms Unit, ICI Cent. Toxicol. Lab., Alderley Park, Macclesfield, Cheshire, England) **A comparison of the effects of paraquat and diquat on the water content of rat lung and the incorporation of thymidine into lung DNA.** *Toxicology* 8(2): 223-230; 1977. (17 references)

A comparison was made of the effects of paraquat and diquat on the water content of rat lung and the incorporation of thymidine into lung DNA. After dosing rats with paraquat at 105 μmol/kg b.w. there were no deaths in the first 24 hr. After this same period of time, 22% of the rats given diquat died. The largest proportion (34%) of the rats which died after paraquat did so on the third day. The death of paraquat poisoned rats was related to lung damage. Thymidine incorporation into lung DNA was significantly decreased one day after dosing with both chemicals, but became greatly elevated in a proportion of those rats given paraquat which survived 3 days after dosing. In diquat-poisoned rats, thymidine incorporation into lung DNA remained depressed for at least 8 days. It is concluded that most rats given paraquat by i.p. injection die from acute lung damage characterized by a dramatic increase in the lung water content; only a small proportion die many days later from lung fibrosis; and diquat does not cause lung damage as characterized by either increases in water content or increases in thymidine incorporation into DNA.

78-0427. Weis, J. S. ; Weis, P. (Dept. Zool. Physiol., Rutgers Univ., Newark, NJ 07102) **Retardation of fin regeneration in *Fundulus* by several insecticides.** *Trans. Amer. Fish. Soc.* 104(1): 135-137; 1975. (14 references)

The retardation of fin regeneration in killifish *Fundulus heteroclitus* by several insecticides was studied. The insecticides used in the experiments included DDT, malathion, parathion, and sevin (carbaryl) all of which affect the nervous system. A concentration of 10 ppb insecticide was used in all experiments. Although DDT was quite toxic to the fish, it did not retard regeneration as much as did the other insecticides, showing significant retardation only after 2 weeks. The malathion, parathion, and sevin treatments retarded regeneration to a greater extent; it is noted that these three are acetylcholinesterase inhibitors. It is suggested that there may be a relation between acetylcholinesterase inhibition and fin regeneration, although the effect on regeneration was probably not directly related to this enzyme's inhibition.

78-0428. Khaykina, B. J. ; Ivan'tskiy, V. A.; Shilina, V. F. (All-Union Res. Inst. Hyg. Toxicol. Pestic. Polym. Plastic Materials, Kiev, USSR) [Metabolism of biogenic amines in rats under the effect of dichlorodiphenyl trichloroethane and polychlorocamphene.] *Ukr. Biokhem. Zh.* 49(5): 46-49; 1977. (5 references) (Russian)

After animals were affected by dichlorodiphenyl trichloroethane (DDT) and polychlorocamphene, some indices of serotonin and catecholamine metabolism were investigated. An increase in serotonin metabolism and the sympathoadrenal system activity was observed. Also, due to the administration of polychlorocamphene, the shifts in the catecholamine metabolism are more pronounced.

78-0429. Waiwood, K. G. ; Johansen, P. H. (Dep. Zool., Univ. Guelph, Guelph, Ontario, Canada) **Oxygen consumption and activity of the White Sucker (*Catostomus commersoni*), in lethal and nonlethal levels of the organochlorine insecticide, methoxychlor.** *Water Res.* 8(7): 401-406; 1977. (29 references)

The influence of methoxychlor on the pattern of oxygen consumption and locomotor activity of white suckers (*C. commersoni*) was investigated. The fish, 8-12 cm in length and 9-25 g in weight, were studied in 15°C water--with nothing added, with 0.10 ppt (parts per thousand) ethanol, or with 0.10 ppt ethanol plus 0.01, 0.04, or 0.10 ppm methoxychlor. Oxygen consumption was measured with a continuous flow respirometer, and activity was recorded in separate experiments by water movements recorded on a physiograph. The 96 hr LC50 was 0.0345 ppm. At 10 ppm methoxychlor, O_2 consumption 2 to 3.5 times as high as controls was observed, and activity was greatly increased. Fish lost their balance and coordination between opercular and locomotor movements. Fish which died at 0.04 ppm methoxychlor manifested a response similar to the fish exposed to higher concentrations, while the suckers that survived at 0.04 behaved similarly to controls. This study indicates that there is a critical threshold level for the hyperactivity response in individual fish, perhaps determined by differential rates of uptake, excretion, and biodegradation. It appears that uptake rates are associated with respiration rates.

78-0430. Yamamoto, M. M. ; Kasuga, T. (Yamanashi Prefectural Inst. Pub. Health, Kofu, Yamanashi, Japan) **[Studies on the safety of a new molluscicide, 2,5-dichloro -4- bromophenol (B-2).]** *Yamanashi-Ken Eisei-Kogai Kenkyusho Nempo (Annu. Rep. of Yamanashi Inst. Publ. Health)* 20: 57-59; 1976. (6 references) (Japanese)

Manufacture of the molluscicide 3,5-dibromo -4- hydroxy-4'-nitroazobenzene (Yurimin) used against *Blanfordia nosophara*, the vector of *Schistosoma japonicum* has been stopped. The most desirable candidate molluscicide, 2,5-dichloro-4-bromophenol, was studied in terms of its safety by Rec-assay using *E. coli* K-12 AB1157 and its recA mutant *E. coli* K-12 AB2463. The results of studies showed that the candidate molluscicide does not cause damage to DNA and does not affect the rate of mutation for resistance to nalidixic acid of the bacteria. The only difference between AB1157 and AB2463 was in resistance to the candidate molluscicide, 2,5-

dichloro-3-bromophenol, that is, AB1157 was not killed at the concentration of 10 micrograms of the molluscicide while AB1463 was killed at the same concentration. The LD50 p.o. of dichlorobromophenol is 2,000 mg/kg in the mouse as compared to 168 mg/kg of Yurimin. Also the TLm(48h) of the former to carp is 1.31 ppm as compared to 0.16 ppm of Yurimin. The residual concentration of the candidate molluscicide in rice was less than 0.005 ppm after 4 times of application. In short the candidate molluscicide seems to be somewhat safer than Yurimin.

78-0431. Rathmann, D. (Forschungs abt. Biol. Anwendungstechn. PSM, VEB Chemiekombinat Bitterfeld, DDR) Enzymatische Untersuchungen nach Aerosolinhalation von Wofatox im Tierexperiment. [Enzymatic studies following inhalation of wofatox aerosol in an animal experiment.] *Z. Gesamte Hyg.* 23(8): 538-540; 1977. (3 references) (German)

A study was made of the action of different aerosol Wofatox (methyl parathion) concentrations on Syrian marmots. The study used blood counts and biochemical methods of analyses. Those animals which had been exposed to the highest dosage exhibited aggravated aggressiveness, while responses demonstrated by other animals were within physiological limits. Intoxication caused more or less strongly pronounced weight drops as compared to the original weights and to the control animals. Epithelial defects of respiratory organs were aggravated along with the aerosol effect by increasing test substance concentrations. Tracheal lesions were in all cases more strongly marked than changes in the lower sections of the respiratory system. Blood count and hemochemical values underwent changes which were dependent on the concentration of the aerosol to which the animals were exposed. No comparable changes were noted among the controls.

78-0432. Smart, N. A. (Committee for Analytical Methods for Residues of Pesticides and Veterinary Products in Foodstuffs of the Ministry of Agriculture, Fisheries and Food, Harpenden, Herts., England AL5 2BD) **Determination of residues of organophosphorus pesticides in fruits and vegetables.** *Analyst* 102(1220): 858-868; 1977. (6 references)

A panel was set up by the Ministry of Agriculture, Fisheries and Food to investigate and recommend suitable multi-residue gas-liquid chromatographic methods for a wide range of organophosphorus pesticide residues in a wide range of fruits and vegetables. A detailed revision of the method of Abbott *et al* was prepared in which a small amount of prophylene glycol "keeper" remained after evaporation in order to avoid the extract being taken completely to dryness. The method was regarded as established for the determination of malathion, dichlorvos, dimethoate, omethoate, and parathion in carrots, beans, peas, apples, tomatoes, and lettuces. It should also be widely applicable to the determination of many other non-polar and medium-polarity organophosphorus pesticides and to a wider range of fruits and vegetables. A slight modification of method was necessary to obtain sufficiently favorable partition characteristics in the case of the more polar organophosphorus pesticides. The Watts *et al* method was modified by substitution of a 1+1 mixture of toluene-acetone for the more toxic benzene in the elution mixture. The method was regarded as established for the determination of malathion, dichlorvos, dimethoate, omethoate, azinphosmethyl, and parathion in lettuces, carrots, peas, apples, tomatoes, and plums, and should also be applicable to the determination of many other substances in a wider range of fruits and vegetables. The methods of Sissons and Telling were applied to a wide range of polar and non-polar species. Acceptable results were obtained with the method for non-polar species, but the results for dichlorvos using the method for polar species were more variable. No significant differences were found using different gas-liquid chromatography columns or using alkali flame ionization versus flame photometric detection. The different analytical methods studied are described in detail.

78-0433. Sloane, H. J. ; Obremski, R. J. (Scientific Instruments Div., Beckman Instruments, Inc., Irvine, Ca 92713) **Microsampling in the infrared - use of special techniques.** *Appl. Spectroscopy* 31(6): 506-515; 1977. (8 references)

Infrared examination of small quantities of sample is best accomplished by reducing the sample beam area with appropriate size apertures. The ultimate limitations to such a technique are the energy loss incurred and aperturing effects which distort the baseline. Energy throughput with small apertures may be improved by using auxiliary beam condensing optics. Aperturing effects may be minimized by using a common beam aperture or by digitally subtracting the distorted baseline from the sample spectrum. If real gains in sensitivity are to be realized, scale expansion should be accompanied by an adjustment of instrument parameters to improve the signal/noise ratio. Even when this is done, however, electronic ordinate scale expansion has the effect of exaggerating sloping baselines and impurity bands. An alternate method of digital scale expansion allows some correction of these defects where a background spectrum may be subtracted off. Digital expansion through absorbance rather than transmittance also yields a better simulation of the spectrum which would have been obtained for a larger quantity of sample.

78-0434. Schaefer, R. G. (Inst. Meeresforsch., 285 Bremerhaven, Germany) **Massenspektrometrische Identifizierung und Quantifizierung von Chlorkohlenwasserstoffen in Fisch. [Mass spectrometric identification and determination of organochlorine hydrocarbons in fish.]** *Chem. Ztg.* 5: 241-247; 1974. (27 references) (German)

A combination g.c./m.s. method for analyzing chlorinated hydrocarbons in marine fish is described. Substances that were detectable included: *p,p'*-DDT, *p,p'*-DDD, *p,p'*-DDE, hexachlorobenzene, and several PCB isomers (tetra-, penta-, hexa-, hepta-, and octachlorobiphenyls). Aldrin, heptachlor and lindane were undetected. The applied clean-up procedure excluded the detection of dieldrin. The lowest detectable quantities of these substances are given. Quantifica-

tion was accomplished through mass chromatography using a dedicated computer system.

78-0435. Suzuki, M. ; Yamato, Y; Watanabe, T. (Kitakyushu Municipal Inst. of Environmental Health Sciences, Tobata-ku, Kitakyushu-City, Japan 804.) **Analysis of environmental samples for organochlorine insecticides and related compounds by high-resolution electron capture gas chromatography with glass capillary columns,** *Environ. Sci. Technol.* 11(12): 1109-1113; 1977. (15 references)

Resolution efficiencies of organochlorine insecticides and their related compounds with wall-coated open tubular (WCOT) and support-coated open tubular (SCOT) glass capillary columns (GCC) were compared with those of conventional packed glass columns (PGC) by use of electron capture gas chromatography. These columns were coated with silicone OV-101 as the liquid phase. Applicabilities of the GCC to environmental samples were investigated. An all-glass system was used to prevent thermal decomposition. The "resolution index" (RI), i.e., peak height/half-width of peak of standard injected, generally increased in the following order, PGC < < WCOT GCC < SCOT GCC. Excellent resolution of insecticides was obtained with SCOT GCC and WCOT GCC. Log-log plots of the RI vs. relative retention times compared to aldrin were linear. This system was well suited to the routine analysis of pollutants in the environment because of its simplicity of operation and shorter analytical time. (Author abstract reprinted by permission of the American Chemical Society)

78-0436. Rama Rao, N. V. ; Tandon, S. N. (Dept. Chem., Univ. Roorkee, Roorkee-247672, India) **Note on the extractive spectrophotometric determination of strychnine with solochrome Green V 150.** *Fresenius Z. Anal. Chem.* 286: 256; 1977.

A direct spectrophotometric method for the determination of strychnine, which has much better sensitivity than many earlier methods and which gives results on standard sodium strychnine sulfate samples that are in good agreement (within 2%) with those obtained with the ammonium metavanadate method is presented. The method is based on the color of the extracted ion pair complex formed between strychnine and the acid dye Solochrome Green V 150. The precision of this method is ± 1.5%, and even a 10-fold excess of citric acid, aspirin, sodium barbiturate, phenobarbitone, sodium salicylate, sodium benzoate, glucose, fructose, saccharine, saccharine sodium, and calcium carbonate does not interfere.

78-0437. Babkina, E. I. ; Mironyuk, G. V.; Dibtseva, A. V. (Institute of Experimental Meteorology, USSR) **Opredelenie v pochve i vode khlororganicheskikh pestitsidov i polikhlorbifenilov pri sovmestnom prisutstvii. [Determination of organochlorine pesticides and PCBs in the same soil and water samples.]** *Khim. Sel'sk. Khoz.* 15(7): 35-42; 1977. (21 references) (Russian)

A method for determining PCBs (Clophen A-50), hexachlorobenzene, alpha-BHC, lindane, DDT, DDD and DDE in the same soil and water sample is described. Following extraction with hexane and acetone from soil, and with *n*-hexane from water, the extracts are subjected to alkaline dehydrochlorination in alcoholic potassium hydroxide solution at 55-58°C, and analysis is carried out by gas-liquid chromatography with an electron-capture detector. DDT, DDD, and DDE are determined via the difference in the peak heights before and after alkaline dehydrochlorination. The sensitivity of the method amounts to 0.30 μg/l in water and 0.03 mg/kg in soil for PCBs; to 0.03 μg/l in water and 0.5-5 μg/kg in soil for the organochlorine pesticides. The relative error is ± 20%. The readings are linear for PCBs in a range of 0.5-3.5 ng.

78-0438. Chmil', V. D. ; Glembitskii, N. I. (Vniigintoks, USSR) **Opredelenie trikhloratsetata natriia v vode, pochve i sakharnoi svekli. [Determination of sodium trichloroacetate in water, soil, and sugar beets.]** *Khim. Sel'sk. Khoz.* 15(7): 42-44; 1977. (8 references) (Russian)

A gas-liquid chromatographic method for the determination of trichloroacetic acid and its sodium salt in soil, water and sugar beets in the form of trichloroacetic acid methyl ester is described. Following extraction with diethyl ether, reextraction and purification, trichloroacetic acid is methylated with dimethyl sulfate. The pesticide is then extracted with *n*-hexane, and is determined on a gas chromatograph with electron capture detector. The recovery rates are 89.2±2.2% from water, 75.7±2.4% from soil, and 79.3± 1.8% from sugar beets. The sensitivity of the method amounts to 0.013 mg/liter in water, 0.2 mg/kg in soil, and 0.1 mg/kg in sugar beets. The smallest detectable amount of trichloroacetic acid methyl ester is 15 ng.

78-0439. Ermakov, V. V. ; Bolokhovets, M. F. (All-Union Sci. Res. Inst. of Vet. Hyg., USSR) **Gazokhromatograficheskoe opredelenie zookumarina v biologicheskikh ob'ektakh. [GLC determination of zoocoumarin in biological materials.]** *Khim. Sel'sk. Khoz.* 15(7): 44-45; 1977. (6 references) (Russian)

A method for the determination of zoocoumarin (Russian-manufactured warfarin preparation) in animal tissues and organs is described. After extraction with chloroform and chromatographic cleanup on an alumina-packed column, the pesticide is eluted with a mixture of acetone and 2% sodium hydroxide solution. The pesticide is methylated, and the methyl ester of zoocoumarine is determined on a gas chromatograph with electron capture detector. The retention time is 2.5 min. The linear range is 5-25 ng. The lowest limit of detectability is 1 ng, and quantitative determination is possible above 0.02 mg/kg. The recovery rate is 80±5%.

78-0440. Leshchev, V. V. ; Talanov, G. A. (All-Union Scientific Research Institute of Veterinary Hygiene, USSR) **Opredelenie ostatkov fosfororganicheskikh pestitsidov pri**

pomoschi tonkosloinoi khromatografii s fermentnym proiavleniem. [Determination of organophosphate pesticides by TLC with enzymatic detection.] *Khim. Sel'sk. Khoz.* 15(7): 46-48; 1977. (24 references) (Russian)

A thin-layer chromatographic method with indirect enzymatic detection for the identification and quantitative determination of organophosphate pesticide residues in milk, feed, animal and plant tissues is described. The pesticides are extracted from the samples with acetone, the extracts are purified, the thionophosphates are activated by treatment with hydrogen peroxide, and the determination is done on a silica gel layer, using a mixture of acetone, benzene, hexane and chloroform as the solvent system. The spots are visualized by the application to the silica gel plate of indicator paper treated with bromthymol blue and acetylcholine chloride. Unknown organophosphates are identified by comparison of their Rf values with that of metaphos. The sensitivity of the method amounts to 0.1-0.5 μg in standard solutions, or 0.01-0.05 mg/kg.

78-0441. Zor'eva, R. D. (VNIIGINTOKs, USSR) **Khromatograficheskoe opredelenie ftalofosa v pochve i smyvakh. [Chromatographic determination of phosmet in soil and washings.]** *Khim. Sel'sk. Khoz.* 15(8): 19-20; 1977. (2 references) (Russian)

A thin-layer chromatographic method for the determination of phosmet in soil and in washings obtained from plants with acetone and from skin with ether or acetone is described. Following extraction with acetone and reextraction with chloroform, the chloroform extract is evaporated, and the dry residue is dissolved in ether and applied to a LS 5/40 silica gel plate, using a 1/2 mixture of acetone and hexane as the solvent system. After drying, the plate is sprayed with a water-acetone mixture of bromphenol blue and silver nitrate. Phosmet appears in the form of dark blue spots. Quantitative determination is possible by assessing the intensity and size of the spots. The sensitivity amounts to 1 μg; the recovery rate is about 90%.

78-0442. Krasnykh, A. A. (All-Russian Sci. Res. Inst. Plant Protection., USSR) **Opredelenie geterofosa v vode, pochve i ovoshchakh metodom khromatografii v tonkom sloe. [Thin-layer chromatographic determination of heterophos in water, soil and vegetables.]** *Khim. Sel'sk. Khoz.* 15(8): 20-21; 1977. (Russian)

Following extraction of heterophos with hexane, the extract is purified by two-dimensional chromatography, using benzene and chloroform as solvents. Thin-layer chromatographic determination is done on silicagel KSK, using bromophenol blue and silver nitrate for visualization, and 10% acetic acid and 2% citric acid for development. Heterophos appears in the form of dark blue spots against yellow background, the *Rf* being 0.65-0.68. The method is specific for heterophos. The minimum detectable amount is 1-2 μg, the sensitivity amounts to 0.02-0.04 mg/kg, and the recovery rate is 80-95%.

78-0443. Tafuri, F. ; Businelli, M.; Patumi, M.; Marucchini, C. (Centr. Stud. Chim. Antiparassitari del C.N.R., Istituto Chem. Agrar. Univ. S. Pietro, 06100 Perugia, Italy) **Confirmation of perfluidone residues in rice by gas-liquid chromatograhy following the formation of derivatives.** *Pestic. Sci.* 8(4): 331-336; 1977. (9 references)

A simple and sensitive method for the confirmation of perfluidone residues in rice grains is described. The procedure involves extraction, purification on an anion-exchange resin, chlorination, methylation and gas-chroamtographic analysis with electron capture detection. The recoveries from fortified rice grains varied from 84.0 to 92.4% in the range 0.01-0.20 mg/kg. The sensitivity was such that perfluidone could be detected down to a level of 0.005 mg/kg. The method can be used for confirmation of perfluidone quantitatively as well as qualitatively. (Author abstract by permission)

78-0444. Holland, P. T. (Soil and Field Res. Organization, Ruakura Agr. Res. Cen., Hamilton, New Zealand) **Routine methods of analysis of organophosphorus and carbamate insecticides in soil and ryegrass.** *Pestic. Sci.* 8(4): 354-358; 1977. (16 references)

The organophosphate insecticides dichlorvos, trichlorphon and isofenphos have been extracted from soil and ryegrass by blending with acetone + benzene (19 + 1, v/v) and charcoal. After filtering, water and waxes were precipitated from the extract at -78°C. The extracts were analysed for insecticide by gas chromatography using alkali flame-ionisation detection. Trichlorphon was converted to the acetate by on-column acetylation. Recoveries ranged from 73 to 93% for levels of insecticide from 0.1 to 10 mg/kg. The carbamte insecticides methomyl and carbofuran plus the metabolite 2,3-dihydro- 3-hydroxy- 2,2- dimethylbenzofuran-7-yl methylcarbamate have been extracted from soil and ryegrass samples by shaking with acidified ammonium acetate. Following filtration and neutralisation, the aqueous phase was extracted with dichloromethane. The carbamates in the extracts were determined by gas chromatography using on-column trans-esterification to methyl methylcarbamate. Recoveries ranged from 79 to 97% for levels of insecticide from 0.1 to 10 mg/kg. (Author abstract by permission)

78-0445. Desmarchelier, J. ; Bengston, M.; Connell, M.; Minett, W.; Moore, B.; Phillips, M.; Snelson, J. (Div. Entomol., P.O. Box 1700, Canberra City, ACT 2601, Australia.) **A collaborative study of residues on wheat of chlorpyrifos-methyl, fenitrothion, malathion, methacrifos and pirimiphos-methyl.** *Pestic. Sci.* 8(5): 473-483; 1977. (26 references)

The accurary and reproducibility of analytical methods for the assay of five organophosphorus grain protectants have been investigated by a coordinated test program. Results were assessed using data from field, applications of chlorpyrifos-methyl, fenitrothion, malathion, methacrifos and pirimiphos-methyl at commercial silos in New South Wales and Queensland. A satisfactory analytical procedure is recommended following an extended series of tests. (Author abstract by permission)

78-0446. Draffan, G. H. ; Gilbert, J. D.; Davies, D. S. (Inveresk Res. Internat., Inveresk, Edinburg, Scotland.) **Gas-liquid chromatographic determination of paraquat in body fluids.** *Proc. Eur. Soc. Toxicol.* 18: 186; 1977.

Using 1,1′-diethyl- 4,4′-dipyridyl dichloride as an internal standard, 0.1 μg paraquat/ml plasma may be determined using flame ionization detection, and 0.025 μg/ml using nitrogen selective flame ionization detection. Reduction of paraquat salts with sodium borohydride yields a diene amenable to solvent extraction and gas chromatography. These methods, which have been developed over a 3-yr period, have been extensively applied to the pharmacokinetics of paraquat in man for assessment of risk to patients and for monitoring treatment; these techniques are also useful in trace forensic analysis.

See also 78-0233 78-0285 78-0350 78-0351 78-0353 78-0354 78-0400 78-0421 78-0422

78-0447. Lewis, R. G. (Health Effects Res. Lab., U.S. EPA, Res. Triangle Park, NC 27711) **Determination of arsenic and arsenicals in foods and other biological materials.** *Residue Rev.* 68: 123-144; 1977. (128 references)

Methods of assessing arsenic contamination in foods and other biological materials are presented. The use of organic and inorganic arsenicals as pesticides is an important cause of arsenic pollution. Man has accumulated between 0.001 to 3 μg/g of arsenic in his body tissues, largely as the result of food intake. The assessment of arsenic in foodstuffs requires careful planning because of variation in cooking and in the portion of the foodstuff which is actually ingested. Colorimetric, atomic absorption spectrometric, radioactivation, chromatographic, electrical, and spectroscopic methods for determination of arsenic residues are discussed. Field desorption mass spectrometry is useful for identification of specific organoarsenicals, but is too costly and sophisticated for general application.

78-0448. Gyula, P. (Nehezvegyipari Kutato Intezet, Veszprem, Hungary) **A novenyvedoszer maradvanyanalizis fejlodesi iranyai. [Recent developments in pesticide residue analysis.]** *Magy. Kem. Lapja* 23(4): 186-189; 1977. (Hungarian)

Details of sensitivities of the individual methods for treating the methodological problems of pesticide residue analysis are given, including a summary of duties referring to control and research. A two-directional approach in residue analysis is outlined: on the one hand, the structure of the pesticide would be confirmed along with the actual analysis; and, on the other hand, procedures which do not require special preparations and more complicated equipment will come to replace less efficient methods. According to the authors, in the first case, the use of spectroscopic methods will predominate. In the second case, imaginative applications of homemade instruments and equipment will prevail.

78-0449. Malinin, O. A. (UNIIEV) **Aktivnost' arilesterazy v norme i pri intoksikatsii [The activity of arylesterases under normal conditions and in case of poisoning.]** *Veterinariya* 6: 92-94; 1977. (Russian)

A colorimetric method for determining the activity of arylesterase under normal conditions and in case of poisoning is described. Twenty mm^3 of blood was put in a test tube with 1 ml of distlled water, and 0.5 ml of M/15 phosphate buffer, pH 7.2, and 0.5 ml of substrate solution added to it. On the day of the experiment, 25 mg of α-naphthylacetate is dissolved in 6 ml of ethyl alcohol. To this 19 ml of distilled water is added and the solution is kept at 37°C for 30 min, after which time 3 ml of ethyl alcohol is added to all test tubes to stop enzyme activity. Under the effect of enzymes, naphthylacetate was dissolved in naphthol and acetic acid and the former measured colorimetrically in amounts of 2-40 μg. It was found that the activity of arylesterase in mice, rats and rabbits was 6-15 times higher than in cattle and pigs. Also, arylesterase played the dominant role in the pathogenesis of animal poisoning with organophosphorus and carbamate pesticides.

78-0450. Sztark, W. (Inst. Anorg. Chem. Technol., Tech. Hochschule Krakow, 31-135 Krakow, Poland). **Spektrophotometrische Bestimmung von Thiuradisulfidfungiziden. 1. Mitt. Analysis von Handelspraparaten. [Photometric determination of thiuram disulfide fungicides. Part I. Analysis of commercial preparations.]** *Nahrung* 19(3): 213-217; 1975. (28 references) (German)

A spectrophotometric method for the determination of thiuram in commercial preparations is described. Following extraction with acetone, the extract is treated with sulfuric acid, hydroquinone and copper acetate solution. The absorbance on the copper-thiuram complex is measured at 420 nm. The absorbance values of the complex are stabilized in 1.5 hr.

78-0451. Bolokhovets, M. F. ; Ermakov, V. V.; Trakhanov. D. F. (VNIIVS) **Sposoby opredeleniia zookumarina. [Methods for determining zoocoumarin.]** *Veterinariya* 6: 106-109; 1977. (Russian)

Methods for determining small amounts of zoocoumarin in animal tissue and biopsy in case of a quick diagnosis of toxicosis are presented as follows: Thin layer chromatography, gas chromatography, and spectrophotometry. These techniques can discover traces of zoocoumarin in the tissue of mice, animal blood, and in biopsies. In case of poisoning, there is 1-10 mg/kg of zoocoumarin in the rat tissue and in the animal blood.

78-0452. Hans-Jurgen, S. (Inst. Lebensmittelchem., TU Berlin, D-1000, Berlin, Germany) **Nachweis von organophosphorsaeureester-Ruckstandedn in Lebensmitteln im PPB-Bereich durch Capillargaschromatographie-Massenspektrometrie-Kopplung [Detection of organophosphorus pesticide residues in food at the ppb level with open tubular column gas chromatography-mass spectrometry.]** *Z. Lebensm. Unters.-Forsch.* 164(3): 153-159; 1977. (10 references) (German)

Application of a combination open tubular column gas chromatography-mass spectrometry-computer for the detection and identification of organophosphorus pesticide residues in food is presented. Twenty-three commonly used organophosphorus pesticides (in Germany) were separated on a 20 m SE-54 glass capillary column with the exception of the phosphamidon-fenchlorphos pair. Individual residues were identified by chemical ionization mass spectrometry (CI) with isobutane and background subtraction. The detection limits of pesticides examined in this study was the lower ppb range. The application of an integrated computer system allowed for the simultaneous determination of 10 pesticide residues at the ppb level found in a sample of cherries.

78-0453. van Haver, W. ; Gordts, L. (Inst. Hyg. Epidemiol., B-1050 Brussels, Belgium) **Vergleich bei der Erfassung von Dithiocarbamaten durch chromatographische Bestimmung von Schwefelkohlenstoff mittels eines flammenphotometrischen Detektors und der colorimetrischen Bestimmung [Analysis of dithiocarbamate pesticide residues: A comparison of the head space and the colorimetric method.]** *Z Lebensm. Unters.-Forsch.* 165(1): 28-29; 1977. (4 references)

Experiments were performed to compare the colorimetric method of dithiocarbamate analysis according to Keppel with a slightly modified head space method of McLeod. For the latter, cut lettuce contaminated with known quantities of zineb were placed in penicillin flasks containing HCl and the reducing agent $ZnCl_2$ and incubated overnight on a water bath. The resulting CS_2, which is quantitatively evolved, is analyzed by GLC with a flame photometric detector. A correlation coefficient of $r = 0.9903$ was found for these two methods.

78-0454. Nagayoshi, E. ; Shiga, N.; Matano, O.; Goto, S. (Inst. Environ. Toxicol. Kodaira, Tokyo, Japan) **[Microdetermination of the residue of a herbicide, α-(2-naphthoxy) propionanilide. Part IV of analysis of pesticide residues by high speed liquid chromatography.]** *J. Pestic. Sci.* 2(4): 445-448; 1977. (6 references) (Japanese)

A method of determining the residue of a new herbicide, naproanilide or α-(2-naphthoxy) propionanilide, and its degradation product, naphthoxypropionic acid (NPA), was established. After extracting both compounds in rice grain or rice straw with acetone, the solvent was distilled off under reduced pressure, then the residues were redissolved in *n*-hexane and extracted with acetonitrile. After dilution of the extract with alkalinized water propionanilide was extracted with ethyl ether. NPA was extracted with dichloromethane after the aqueous solution was acidified with hydrochloric acid. The recovered residues were cleaned up by column chromatography; naproanilide was applied to Florisil column and eluted with *n*-hexane containing 30% of ethyl ether, and NPA was applied to a silica gel column and eluted by with 100:100:50 mixture of *n*-hexane, ethyl ether, and acetic acid. In the case of rice straw, further clean-up by column chromatography was necessary. The determination of both compounds was carried out on a high speed liquid chromatograph with a column packed with Hitachi-gel No. 3010. For naproanilide and NPA, methanol and methanol containing 0.25% of acetic acid respectively, were used as the eluting solvents at a flow rate of 1.5 ml/min, and a fluorophotometer with a flow cell was used as the detector. The excitation wave length was 280 nm, and the emission wave length was 340 nm. No interfering peaks were found in the chromatogram thus obtained. The lower limits of detection of each compound were 0.004 ppm in rice grain and 0.008 ppm in rice straw. The recovery ranged between 74 and 99%.

78-0455. Isshiki, K. ; Tsumura, S.; Watanabe, T. (Inst. Environ. Health, Kitakyushu Municipal Inst., Kitakyushu, Fukuoka, Japan) **[On the analytical determination of piperonyl butoxide.]** *Nihon Shokuhin Eisei Gakkai Dai 34 kai Gakujutsu Koenkai Koen Yoshisyu (Coll. Pap., 34th Annu. Meet. Jpn. Assoc. Food Hyg.)* p. 17; 1977. (1 reference) (Japanese)

The composition of several commercial piperonyl butoxides as well as their synergists was studied by column chromatography (silica gel, eluted with benzene plus acetone, 97:3) followed by TLC (containing a fluorescent indicator, developed with a combination of hexene, cyclohexane, benzene and acetone). Each separated fraction gave a single spot on TLC and a single peak on the gas chromatogram. Data obtained by elemental analysis, EI- and FD-mass spectra, IR spectra, and NMR spectra were analyzed in combination. The content of pure piperonyl butoxide in the synergist was found to be 80.5% as compared to that of the standard material for residue analysis of 98.6%. On the gaschromatographic chart, six peaks were found, and they were identified as follows: peak 1 was 6-hydroxymethyl dihydrosafrole, peak 2 was 6-propylpiperonyl *n*-butylethylene glycol ether, peak 3 was 6-propylpiperonyl *n*-butylethylene glycol ether (piperonyl butoxide), peak 4 was 2-propyl -4,5-dimethoxy *n*-butyldiethylene glycol ether, peak 5 was bis(2-propyl-4,5-dimethylenedioxyphenyl) methane, and peak 6 was di(2-propyl-4,5-methylene- dioxybenzyl) ether.

78-0456. Sakurai, K. ; Mori, M.; Yamada, T.; Sudo, T. (Mie Prefect. Inst. Hyg. Sci., Tsu, Mie Prefecture, Japan) **[Colorimetric determination of carbaryl using diazobenzenesulfonic acid.]** *Nippon Shokuhin Eisei Gakkai Dai 34 kai Gakujutsu Koenkai Koen Yoshisyu (Coll. Pap. 34th Annu. Meet. Jpn. Assoc. Food Hyg.)* p. 31; 1977. (Japanese)

The colorimetric determination of carbaryl was studied by decomposing the sample with alkali followed by steam-distillation and adding diazobenzenesulfonic acid (Pauly's reagent) to determine the extinction at 515 nm. The most pertinent method was found to comprise extracting the sample with benzene, adding petroleum ether to the extract (the supernatant of centrifuge), shaking with alkaline salt solution, adding methanol, sodium hydroxide, and vitamin C to the supernatant, shaking the mixture, adding sulfuric acid to the bottom layer and steam-distilling, adding methanol to the distillate and controlling its pH at 12.0, then adding diazobenzenesulfonic acid to the controlled distillate. Hydrolysates of vegetables contained materials inhibiting the reaction with Pauly's reagent, necessitating steam distillation for separating naphthol from carbaryl. The reproducibility of the method was good and the calibration curve was linear to 100 micrograms. The minimum detectable amount was 25 microgram due to the low extinction. The percentage recovery was always more than 80% of the added amount of authentic material on vegetables.

78-0457. Imanaka, M. ; Matsunaga, K.; Ishida, T. (Okayama Prefectural Environment and Health Center, Okayama, Japan) **[Method of determining *N*-methylcarbamate pesticide residues in eggs and meats.]** *Ni-*

hon Shokuhin Eisei Gakkai Dai 34 kai Gakujutsu Koenkai Koen Yoshisyu (Coll. Pap. 34th Annu. Meet. Jpn. Assoc. Food Hyg.) p. 32; 1977. (Japanese)

Methods for determining residues of *N*-methylcarbamate pesticides in eggs and meats were studied on propoxur, 3,4-xylyl *N*-methylcarbamate, carbaryl, and 4-diallylamino- 3,5-dimethylphenyl *N*-methylcarbamate. A method was devised in which the residues were extracted with acetonitrile and methylene chloride and after evaporating the solvent the residue was extracted with acetonitrile, then with methylene chloride, then after distilling off the solvents the residue was hydrolyzed with sodium hydroxide at 30°C for 20 min. The hydrolysate thus obtained was esterified with monochloroacetic acid, and the ester was determined by gas chromatography with ECD. Column chromatographic clean-up was omitted because of the low pigment content in eggs and meat. The following points should be taken into consideration: (1) methylene chloride was not effective only in the case of eggs; (2) the concentration of monochloroacetic acid should be 3-4%; and (3) after esterification the excess monochloroacetic acid should be removed. The percentage recovery of the method is over 85.

78-0458. Sano, M. ; Furukawa, M.; Kao- Rai- Tsu; Tomita, T. (Shizuoka Pharmaceutical College, Shizuoka, Japan) **[Separation and determination of organotin pesticides and their degradation products.]** *Nihon Shokuhin Eisei Gakkai Dai 34 kai Gakujutsu Koenkai Koen Yoshisyu (Coll. Pap. 34th Annu. Meet. Jpn. Assoc. Food Hyg.)* p. 36; 1977. (Japanese)

Hexakis (β,β-dimethylphenethyl) distannoxane (I) and the two intermediate degradation products, 1,1,3,3-tetrakis (β,β-dimethylphenethyl)- 1,3-dihydroxy- distannoxane (II) and β,β-dimethyl phenethylstannoic acid (III) in and on citrus fruits and apples were extracted, separated and determined. The fruits were homogenized and then extracted with benzene or methylene chloride, both containing acetic acid. After evaporating the extract, the residue was dissolved in benzene containing acetic acid, and silica-gel chromatographed by eluting with benzene containing 0.5% acetic acid to obtain (I), then by eluting with benzene containing 5% acetic acid to obtain (II), and finally be eluting with ether containing acetic acid. Each eluate after evaporating the solvent was dissolved in a mixture of methyl isobutylketone and acetic acid, and its atomic extinction was determined. It was found that the three components (I), (II) and (III) were completely separated by the method and their recovery (fortified at 0.1-4 ppm) was over 85% I) and (II) and over 75% for (III). It was also found that the method was applicable to tricyclohexyltin and its metabolites.

78-0459. Oka, H. ; Nagai, I.; Tosaka, M. (Yamaguchi Prefectural Inst. Hygiene, Yamaguchi, Japan) **[A method for determination of pentachlorophenol in wood chips.]** *Shokuhin Eiseigaku Zasshi (J. Jpn. Food Hygienic Soc.)* 18(5): 419-425; 1975. (17 references) (Japanese)

A method of determining pentachlorophenol in wood chips (for food packaging, now prohibited) was studied. Pentachlorophenol was extracted by steam-distillation, and was extracted with *n*-hexane from the distillate. Then it was transferred to 0.1 M aqueous sodium carbonate solution. Acetic anhydride was added to the solution to convert the phenol to its acetate. Pentachlorophenyl acetate thus formed was extracted with *n*-hexane, and the extract was gas-chromatographed to determine the phenol, using the calibration curve obtained by authentic sample. The percentage acetylation was 98 with a standard deviation of 1.44. It was found that a good clean-up was obtained by column chromatography on a silica gel column containing 5% of water when interfering matter was present in the specimen.

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